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Fixtures for All Requirements

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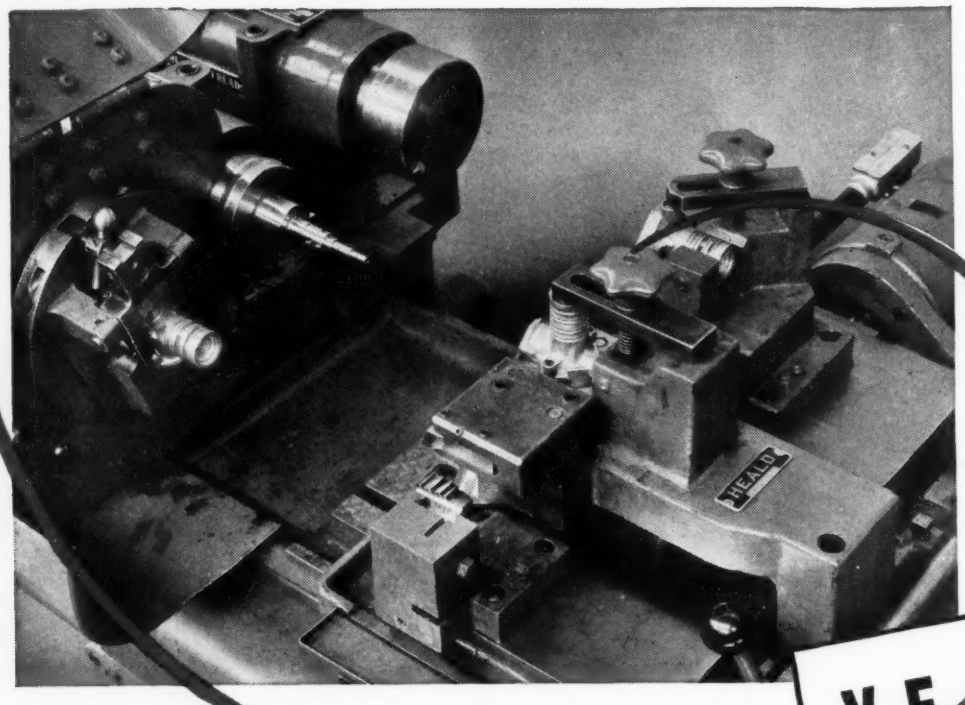

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V.F.4*

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Volume 51 No. 1 MACHINERY SEPTEMBER, 1944

DESIGNING TOOLS TO MEET LABOR SHORTAGE

Maintenance of Production in Spite of the Scarcity of Skilled Help is Essential to Winning the War. This Article Describes Tools and Methods Designed to Counteract Labor Shortages

By J. S. HALDEMAN, Division Manager, Tool Engineering
Lockheed Aircraft Corporation, Burbank, Calif.

FACED with the prospects of a critical labor shortage that threatens to be vastly more serious than the material shortages which were the last major problem, the aircraft industry, in its recent schedules calling for greatly increased production to meet the demands of aerial warfare on many fronts, has been confronted with the problem of achieving a substantial increase in man-power utilization. Only by reducing the number of man-hours necessary to build planes can the industry hope to meet these new production schedules. Owing to a leveling off of these schedules into more certain and less fluctuating schedules, and to the successful efforts of manufacturing men in seeking out ways to do jobs better and faster, the future

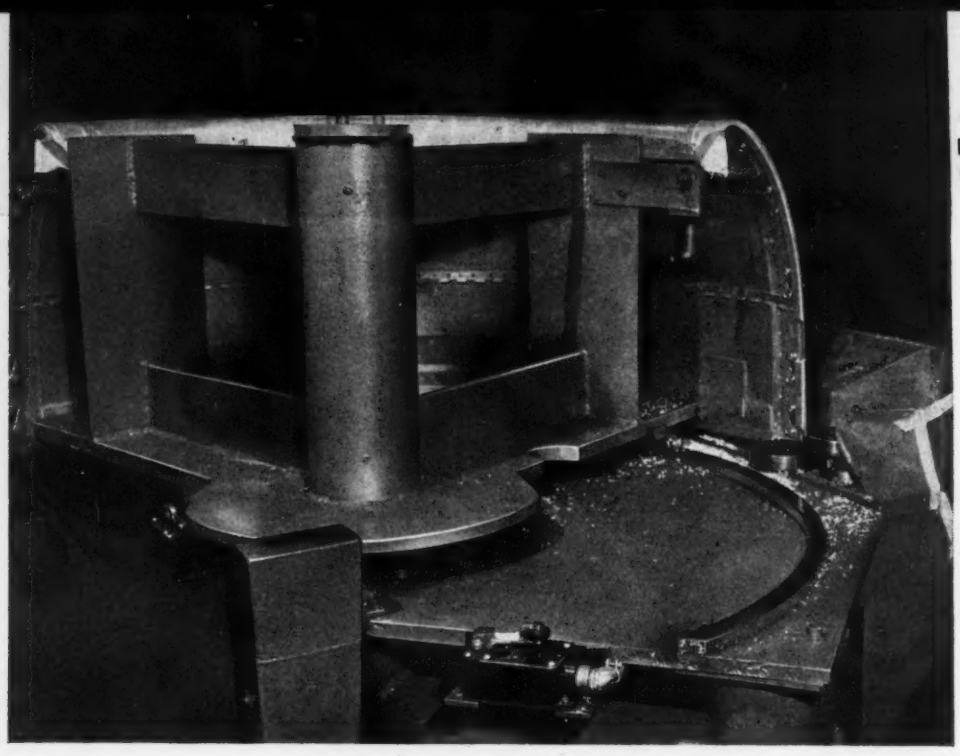


Fig. 1. Machine Designed for the Automatic Beveling of Motor Cowlings for Flying Fortresses

production picture looks brighter by far than it did during the mad rush for man-power a year or so ago.

At the time when the need for reducing the man-hours per plane became apparent, the men taken from important places in the design and production departments by the draft and otherwise also became more and more difficult to replace. However, the Lockheed Aircraft Corporation, keeping a watchful eye on the West Coast's dwindling labor supply, began early to prepare for the inevitable man-power shortage. Gratifying progress has been made in man-hour reductions as a result of this planning. An important contribution to this achievement was the emphasis placed on the design of labor-saving tooling for production operations.

Close coordination between the production departments and the tool designers was considered necessary to the success of the program. In order to effect this coordination, tool liaison men, under the leadership of the manager of the Standard and Service Tooling Department, were placed in all production departments. Their duty is to solve tooling problems and keep production rolling. These tooling experts, working closely with production and design divisions, have solved literally hundreds of production problems through improved tooling.

A typical example of improved tooling resulting from this program is an automatic machine for beveling motor cowlings for Flying Fortresses. This beveling operation, which formerly required one man-hour per segment, is now completed in a matter of seconds. In addition to the reduction in man-hours for the operation,

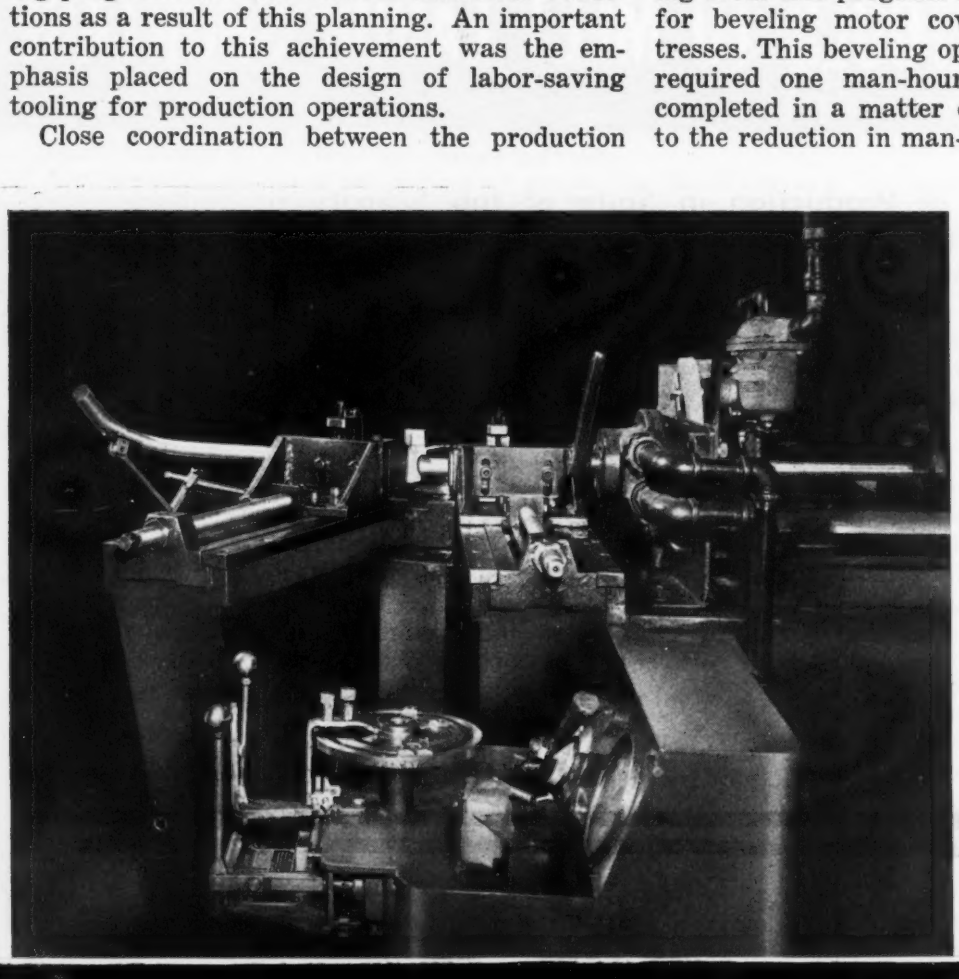


Fig. 2. Bend-degree Dial on Tube-bending Machine Enables Different Bends to be Made at One Set-up

Fig. 3. View of the Tube-bending Machine Showing the Front of the Plane-of-bend Indicator

the quality of the work has increased, and more uniform parts are produced, with less fatigue than by the previous hand methods. Also, accident hazards have been removed.

This beveling machine is shown in Fig. 1. The cowling segments are placed in a jig on the machine, one at a time, being located and held in place by two air-actuated clamps. When the machine is started, the segment is automatically fed along a curved track past a Carboloy-tipped milling cutter that is mounted on the shaft of a motor running at 3600 R.P.M. A roller backs up the cowling opposite the cutter. After the segment has traveled through an arc of 120 degrees, it clears the cutter and strikes a microswitch, which stops the cutter and automatically returns the finished cowling to its starting position in front of the operator.

Notable savings in man-hours have also been achieved by the designing of a bend-degree dial and a plane-of-bend indicator for application to a Wallace power-driven tube bender. The ingenious bend-degree dial, which is seen installed on the machine in Fig. 2, when used in conjunction with the plane-of-bend indicator shown in Figs. 3 and 4, enables the operator to bend an unlimited number of tubes having several bends each with only one set-up of the machine. The required number of bends can be made on a piece in one continuous operation. The dial eliminates the necessity for a separate set-up for each type of bend.

The bend-degree dial is provided with stops that are adjustable around two concentric slots on the dial face. These stops are set to suit each degree of bend desired. They control the

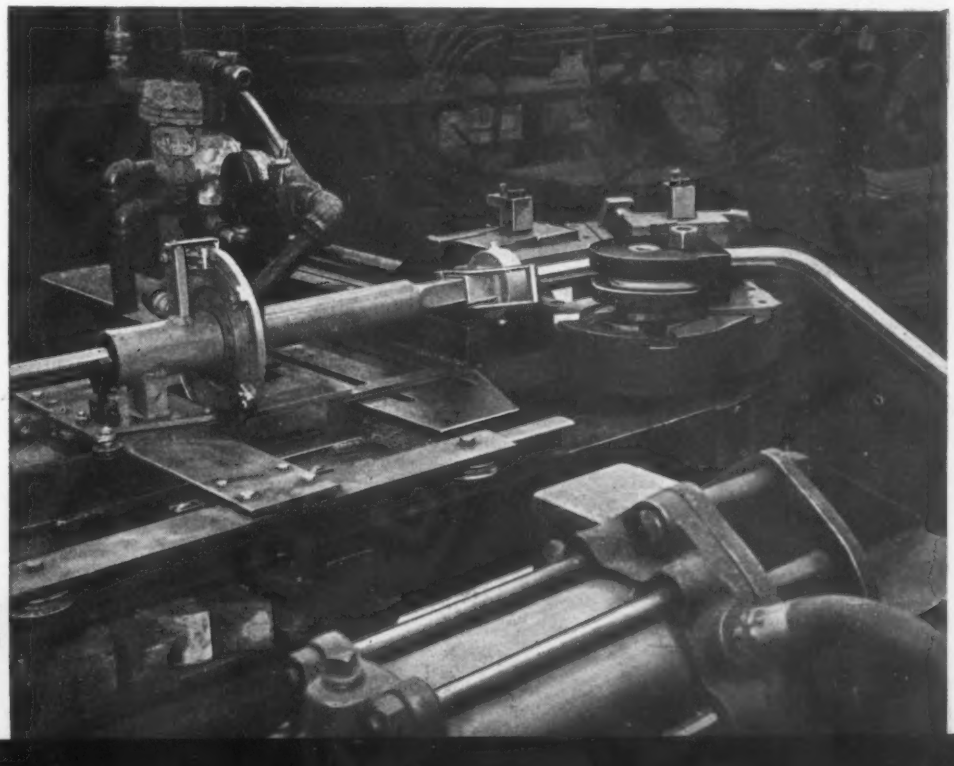


Fig. 4. Rear View of the Plane-of-bend Indicator Seen in Fig. 3, Illustrating Arrangement of Stops

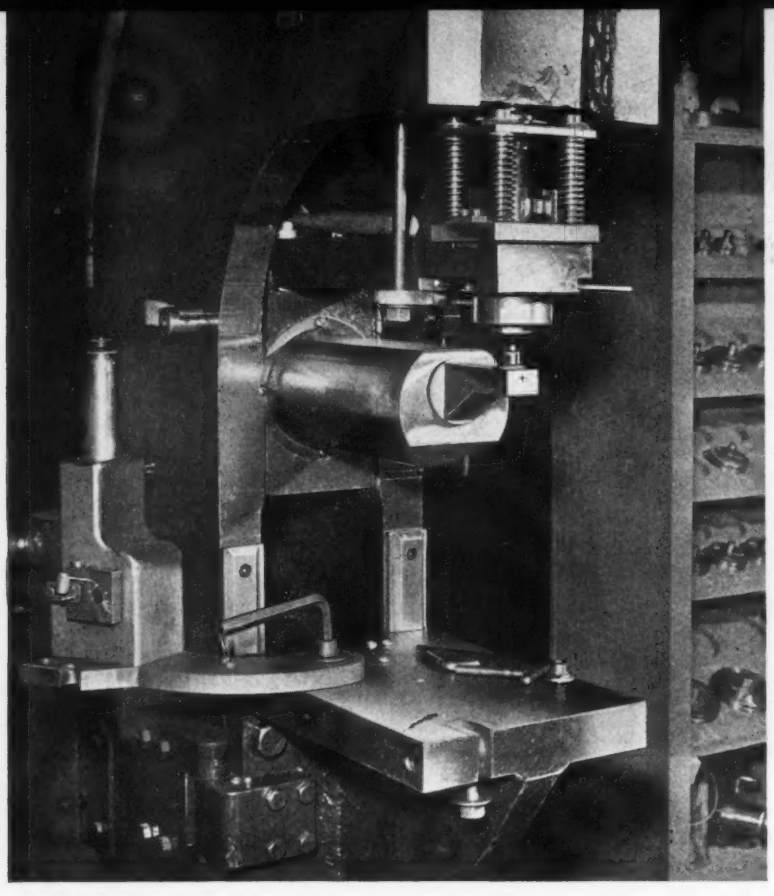


Fig. 5. (Left) Special Horn Press Designed to Punch Holes for Fittings in Electrical Conduit Boxes at a Saving of Approximately 5000 Man-hours a Year. Set-up Shown is for Punching Sides of Boxes

Fig. 6. (Below) Another View of the Horn Press, Showing an Operation in which Use is Made of the Punch-holder Shown Swung Aside in Fig. 5 for Punching Holes in the Bottom of Boxes

angle of bend by tripping an actuating lever, which automatically stops the machine at the desired degree of bend. Successive bends are similarly controlled by setting each stop to the degree of bend required.

The plane-of-bend indicator is mounted on a mandrel attached to the rear end of the tube being bent, as seen in Fig. 4. The dial, in this case also, is provided with adjustable stops which contact with a bolt mounted on a stationary bracket in back of the dial. The front of the dial is graduated to facilitate angular settings. This device makes it possible to predetermine the adjustment of the machine to the planes of bend, with the result that the operation is materially speeded up and the error of visual reading eliminated. Spring-backed balls in the stops engage detents to maintain the settings. Longitudinal location of bends is insured by stops on the machine bed, which are engaged by a latch on the plane-of-bend device.

Thus, with the bend-degree dial, the plane-of-bend indicator, and longitudinally locating stops it is possible for the operator to make one initial set-up that will take care of every operation required in tube bending.

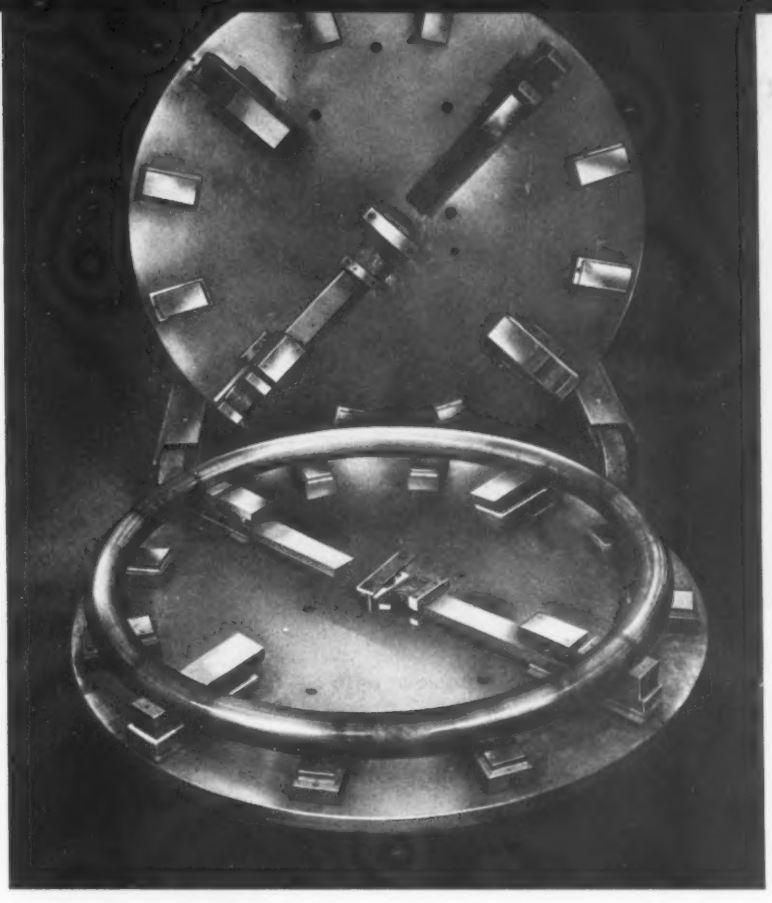


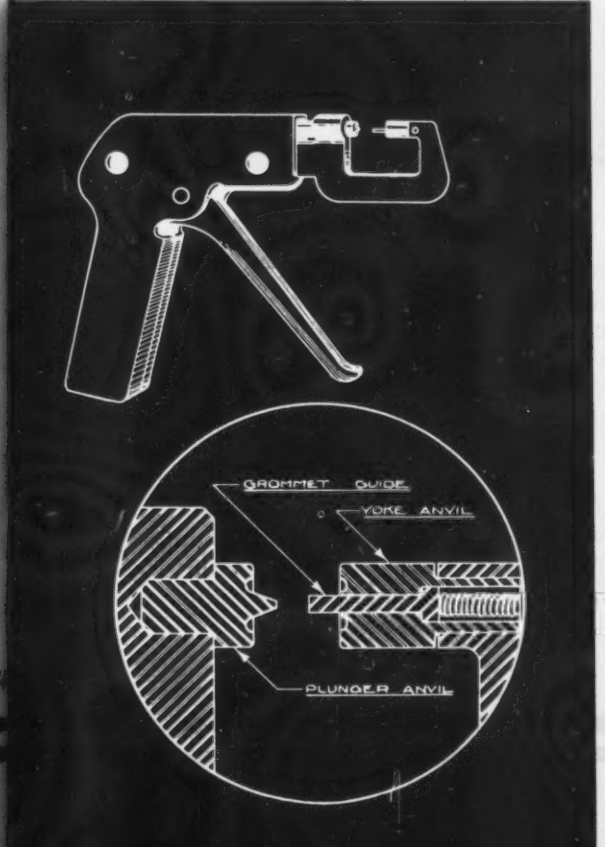
Fig. 7. (Right) Resistance Normalizing Fixture which Combines the Sizing, Normalizing, and Splice Welding Operations on the Motor Mount Ring

Fig. 8. (Below Left) Construction Drawing of a Hand-operated Squeezer for Installing Tack Grommets in Airplane Building Operations

Fig. 9. (Below Right) Sectional Drawing of the Punching Unit Provided on Portable Squeezer Illustrated in Fig. 10

Another time-saving development consists of a horn press, which punches holes for fittings in electrical conduit boxes. The holes were formerly produced with a fly cutter on a drill press, a method that was not only slow and hazardous, but entailed an additioal burring operation. The special horn press effects a saving of sixteen man-hours each twenty-four hours, or approximately 5000 man-hours per year.

This horn press, which is illustrated in Fig. 5, is designed to accommodate 200 different electrical conduit boxes and to punch holes 5/16 inch to 3 inches in diameter. In order to permit punching both the sides and the bottom of the boxes, the horn press has been designed with two special punch-holders. In Fig. 5, the press is set up to punch the sides of the boxes. It will be noted that the design of the horn provides ample clearance for the lower flange of the conduit box during the punching operation. In



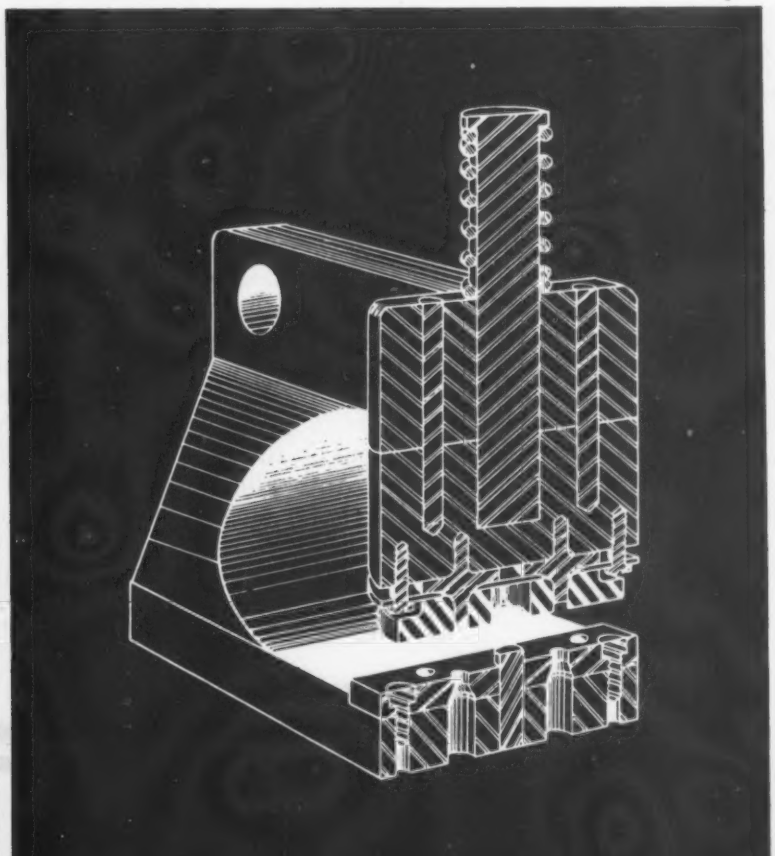


Fig. 10. Portable Squeezer with Special Unit for Punching Plate-nut Holes Two at a Time. This Device Saves 20,000 Man-hours per Year

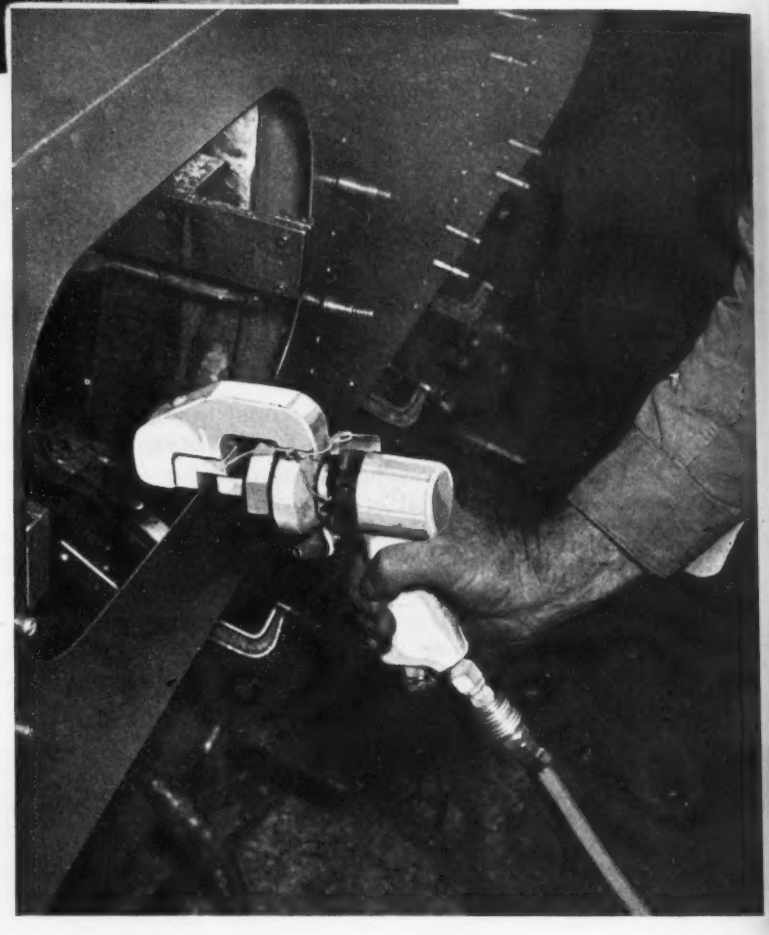


Fig. 11. A Pneumatic Crimper which has Reduced Operational Time to One-tenth the Time Consumed with the Hand Method Previously Employed

Fig. 6, the press is set up to punch the bottoms of the boxes. This is accomplished by sliding the horn set-up in Fig. 5 back into the column to clear the box and swinging the alternate punch-holder, seen pushed to the left in Fig. 5, into position under the die.

Special features of the horn press include a floating die-holder attachment on the ram, which permits a speedy and accurate alignment between the punch and die sets; a spring loaded stripper which can be adjusted to control the length of stroke and push out the metal slugs after each punching operation; a punch-holder anvil which may be depressed to permit the loading and unloading of the conduit boxes; and a punch equipped with a ring of rubber under a flange, which facilitates the stripping of the conduit box from the punch. A notching tool can be used on the machine for cutting slots in the flanges of these boxes. Another tool notches and slots simultaneously.

To facilitate the installation of 3/32-inch and 1/8-inch tack grommets on airplane fuselage and wing skins, etc., a special hand-operated grommet squeezer was designed along the lines shown in Fig. 8. This device is light, portable,

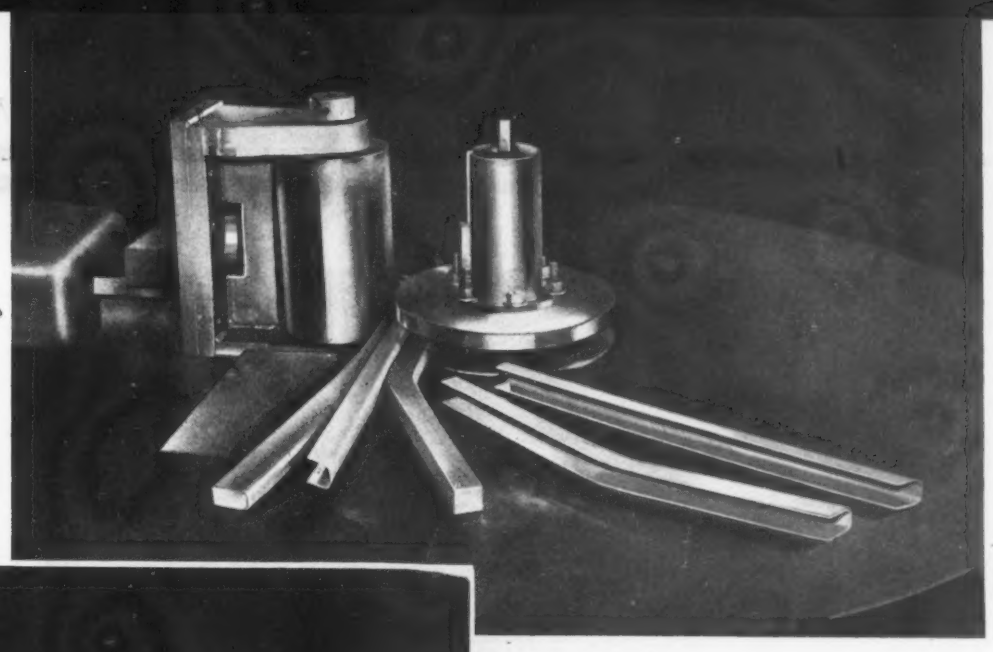


Fig. 12. Wrap Forming Machine Equipped for Bar Forming Operations by the Use of a Spring-loaded Driving Roll on Table and a Pressure Roll on Ram

Fig. 13. Removing a Finished Assembly from One of the Riveting Fixtures Shown in Figs. 15 and 16 after Automatic Punching and Riveting Operation

and inexpensive, and has proved ideal on production lines, where speed is the dominating factor. It consists of a small yoke welded to a Cleco gun. Action of the gun trigger brings the plunger anvil in contact with the grommet and depresses it against an anvil in the yoke.

Another notable development is the resistance normalizer, shown in Fig. 7, which combines in one fixture the sizing, normalizing, and splice welding operations on the motor mount ring. Hold-down clamps located around the ring positively control the correct minimum radii dimensions of the motor mounts.

The ring sizing is such that, when normalized, the shrinking produces a symmetrical ring with the locations for the six motor mount forgings held within acceptable radii dimension tolerances. Allowable expansion is provided for in the clamps, and the contoured shrinkage pads prevent tubular distortion. The extent of the "walking" or "crawling" during expansion and contraction is predetermined and compensated for in the sizing operation to allow for a "splice gap" at the time of final contraction of approximately 1/32 to 1/16 inch, permitting a good weld.

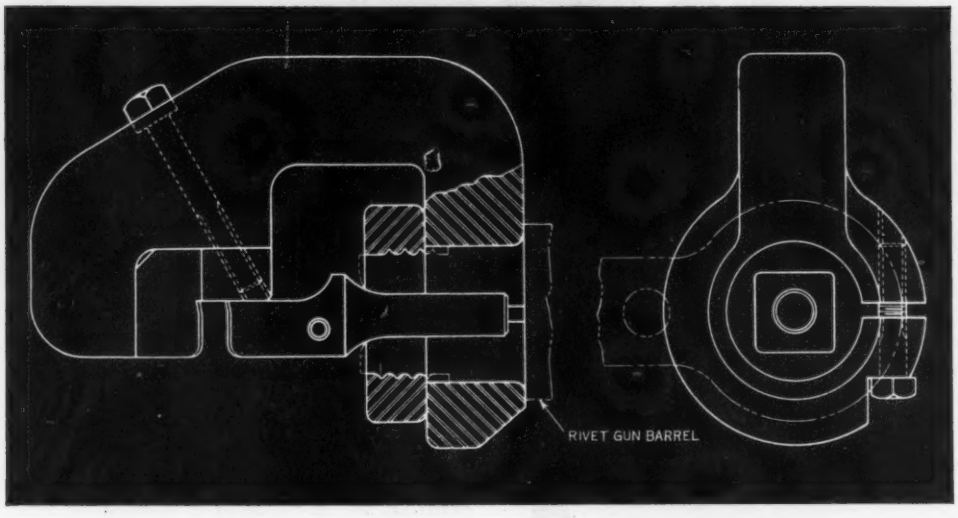


Fig. 14. Construction Details of the Pneumatic Crimper Shown in Use in Fig. 11

The transformer used with this fixture is a constant-duty 440-volt, three-phase unit. The initial load with a ring in position is 125 amperes at 12 volts, dropping to 60 amperes in 30 seconds and bringing the ring temperature up to approximately 1275 degrees in 110 seconds.

The fixture operates automatically through a time switch, permitting the operator to prepare the next ring while the operation is being performed. Since the shut-off is also automatic, it is only necessary for the operator to close the splicing clamp, and when the ring is "black," proceed to weld; then loosen the clamps and remove the ring from the fixture.

The normalized ring and the motor mount forgings are then located in a motor lug positioning and welding fixture on top and bottom coordinated pins which enter the forgings. Tacking and subsequent welding operations of these forgings to the correctly sized pre-normalized ring are then performed. This method has reduced the total fabrication time more than 50 per cent.

The drilling of rivet holes for plate-nut installation has always proved a troublesome problem. The old Lockheed method of producing these holes was slow and tedious. Drill breakage was high, and the drilling necessitated a subsequent burring operation, which materially increased the man-hours necessary to prepare the holes for use.

The development of a punch for piercing the plate-nut rivet holes enables two of these holes to be produced by one quick punching action.

Fig. 15. Simple Riveting Fixture of a Type that Saves Much Time in Rivet Assembling Operations Performed on Automatic Punching and Riveting Machines

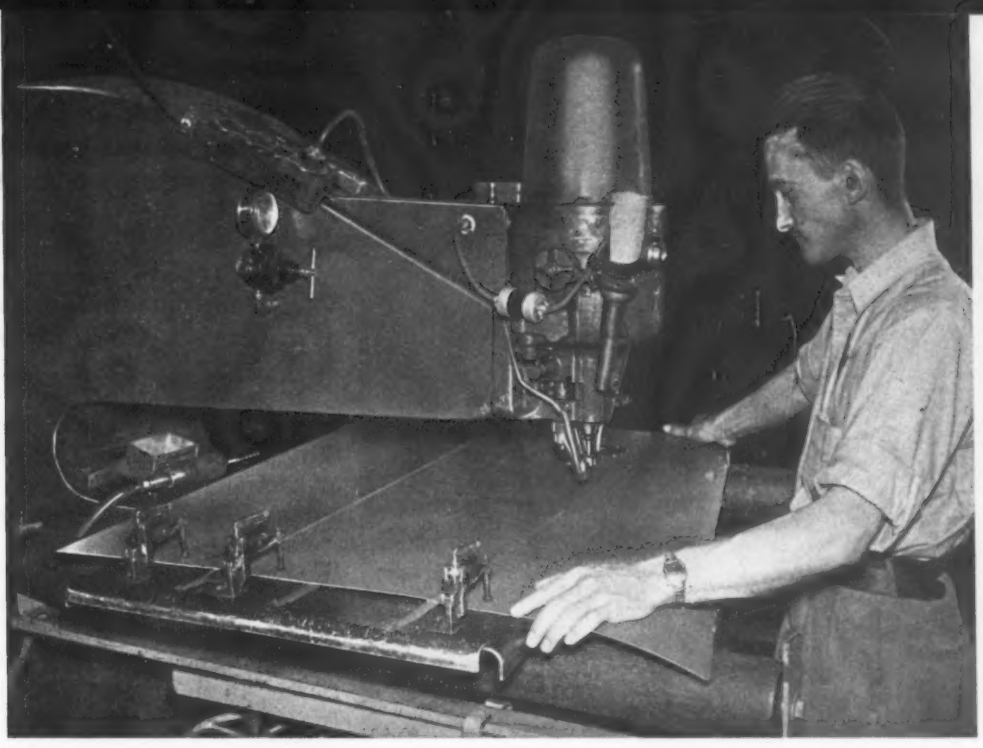
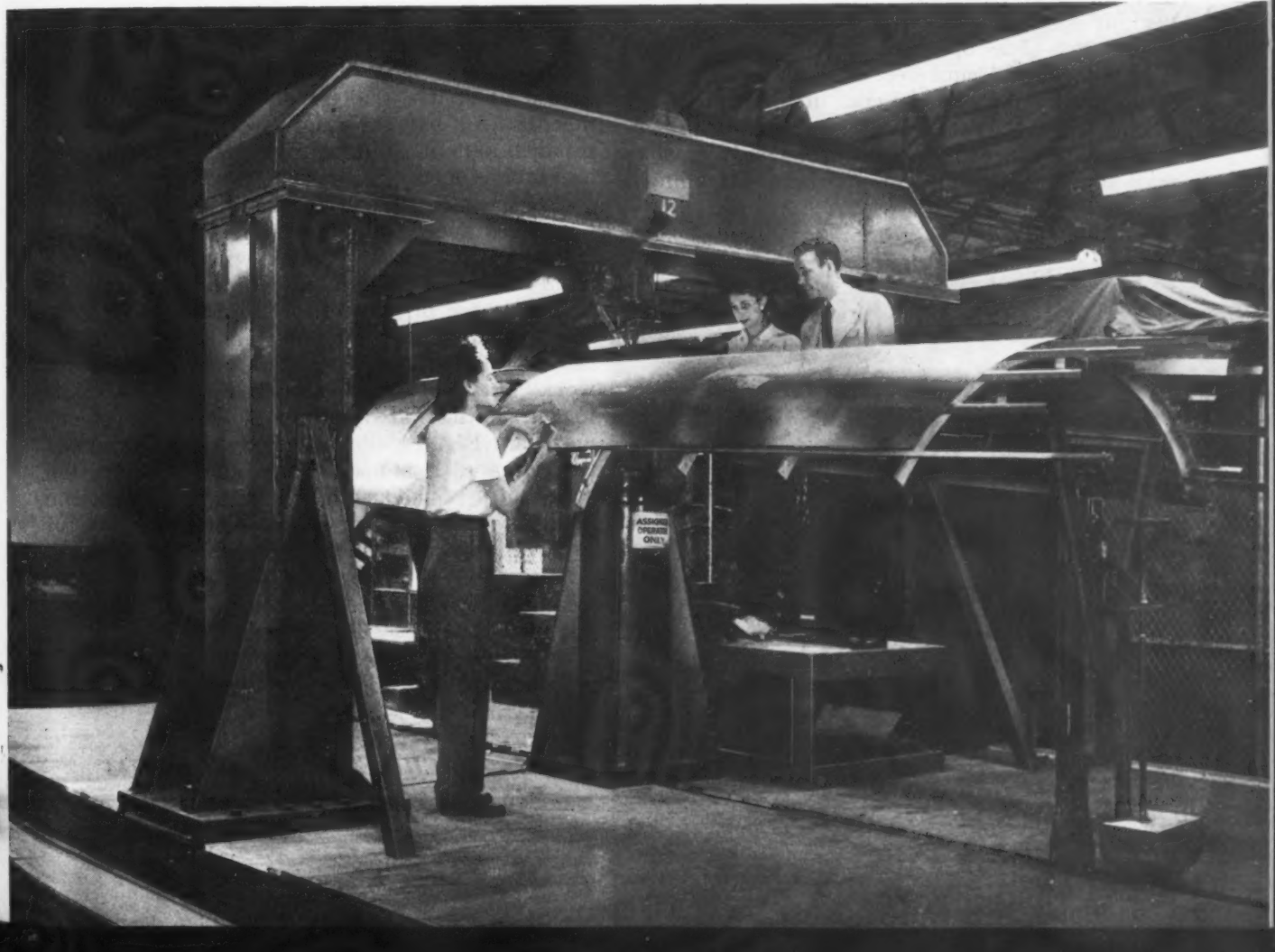


Fig. 16. Typical Automatic Punching and Riveting Operation being Performed by the Use of Simple Fixtures of the Type Shown in Fig. 15

Fig. 17. Erco Beam Type Punching and Riveting Machine which has been Redesigned to Accommodate the Largest Fuselage Panels Required on Flying Fortresses



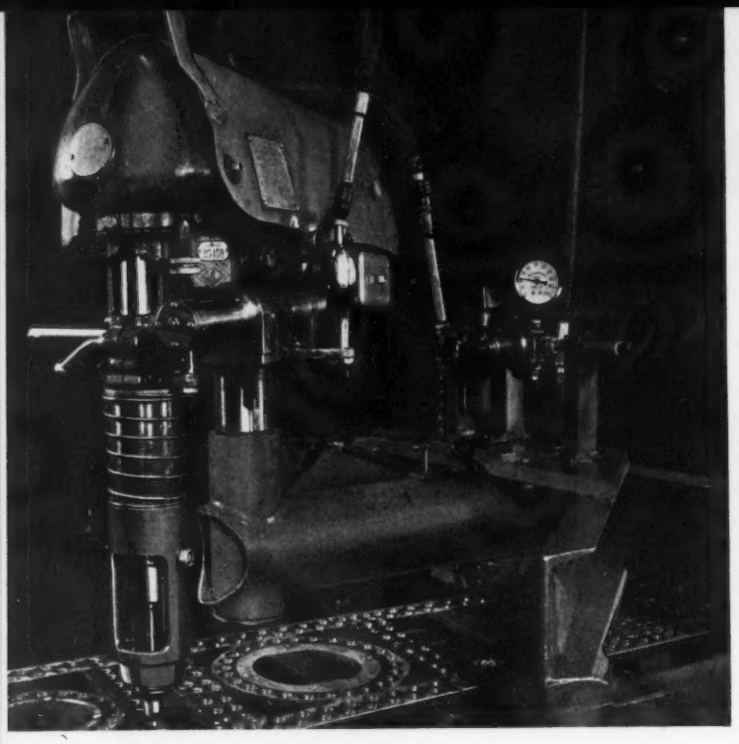


Fig. 18. An Air-operated Self-centering Drilling Attachment which Eliminates the Necessity of Drill Bushings in Jigs

This punch unit is designed for use on a standard No. 214 portable squeezer in the manner illustrated in Fig. 10. The punching unit has a wide application on all current airplanes, and its use is restricted only by the depth of the yoke. A conservative estimate has indicated that by the use of this tool alone, a saving of 20,000 man-hours will be effected per year.

A drawing of the punching unit is shown in Fig. 9, from which it will be observed that a pad of rubber is attached to the punching member for stripping the work from the punches. The punch-slide operates on the front of the holder when the squeezer is actuated.

Many forming attachments of unusual design have been developed for use on standard forming machines, with a gratifying reduction in man-hours. Outstanding is a special attachment for a wrap forming machine, which simplifies the bar method of forming sheet-metal strips or sections formerly employed on a rolling machine. This is accomplished by the use of a spring-loaded roll, such as seen at the right on the machine in Fig. 12. The spring-loaded roll, which is provided with spacers of various widths which are attached to the die shaft, is used as a driver and guide. A wide roll mounted vertically in a bracket attached to the ram head furnishes the necessary pressure, and an air cylinder provides the required cushion to compensate for variation in metal thickness.

The bars are "contoured" to a hard-formed part. By trial runs, the amount of spring-back in the formed parts is determined, and suitable corrections are made on the bars. Heavy slabs of Masonite laid on the table, cover the I-slots and bring the work even with the bottom of the groove on the spring-loaded roll. This eliminates the need of roller work-rests previously required.

When the bar method of forming was previously performed on a rolling machine, excessive repairs were occasioned, and there was a great loss of machine time due to failure of the mainshaft bearing as a result of the heavy strains placed upon it. The use of the wrap forming machine for bar forming has eliminated costly repairs, and in addition, has proved faster and less fatiguing to the worker.

When mass production made it necessary to provide a speedy and more efficient method of crimping than was possible with the previous hand method, a pneumatic crimper was designed as illustrated in Fig. 11. The use of this pneumatic crimper has not only made it possible to release skilled operators for more important work, but has also decreased operational time to one-tenth that required with the previous method. Fig. 14 shows construction details of the crimper. It is used with a standard riveting gun, and performs crimping with uniform, clean results. This tool provides better sealing of joints than was previously possible.

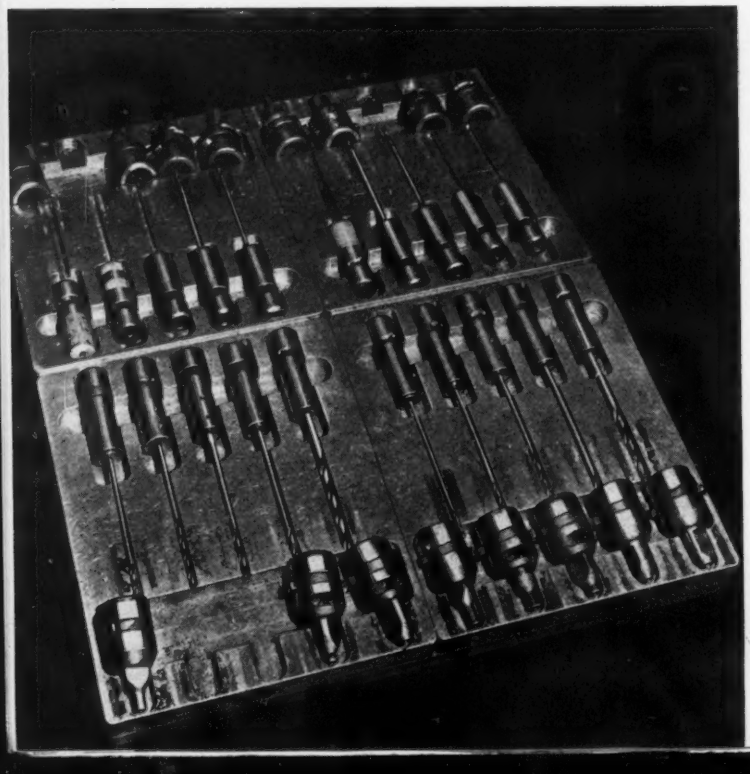


Fig. 19. The Drill Units, Complete with Bushing Adapters and Chuck Adapters, are Stored on Trays Ready for Immediate Use

Fig. 20. The Main Beam Drill Jig Accommodates 125 Parts and Drills 1423 Holes. It has Saved over 1400 Bushings

Careful tool design has also contributed greatly to the productivity of Erco automatic punching and riveting machines. Special riveting fixtures were designed to meet increased production demands. By means of the Lockheed electrolytic process of reproduction, the images of sample assemblies made by hand methods and actually tried on the airplane are transferred to a sheet of duralumin. Cut-outs are then made on this sheet for indexing the fixture in various positions on the stripper of the Erco machine. Clamps are provided to complete the fixtures. Detail parts of the assembly are then placed in the completed fixtures, as shown in Fig. 15, and the assemblies are ready to be riveted in the manner illustrated in Fig. 16.

A finished assembly is seen being removed from the fixture in Fig. 13. The man lifts the fixture quickly in indexing from point to point. These light, efficient riveting fixtures have made it possible to produce thousands of identical assemblies quickly, cheaply, and efficiently.

The man-hours required in the assembly of Flying Fortress fuselage panels have also been reduced to a minimum by redesigning the frame of Erco beam type punching and riveting machines to accommodate the largest of these panels. This was accomplished, as indicated in Fig. 17, by enlarging the frame of the machine, both horizontally and vertically. This necessitated the strengthening of the overhead beam and its supporting members, as well as the addition of a larger heavier base. The length of the pedestal was then increased and a special anvil and stripping mechanism installed.

Two counterbalanced holding fixtures permit the handling of the large panels with ease and efficiency. These fixtures are adjustable along a track in the floor. They have a cradle which is counterbalanced and swings sidewise to suit the shape of the work, and which is also adjustable up and down.

Circumferential stiffeners, stringers, and skin are now "Clecoed" together in the framing and skinning jigs and routed directly to the punching and riveting machine. This method not only eliminates a drilling operation in the framing jig, but also insures speed of operation and uniformly upset rivets, both of which are difficult to achieve by hand methods with unskilled help.

Another outstanding example of improved tool design is an ingenious air-operated self-centering device which may be adapted to any drill press. This attachment eliminates the need for drill bushings in jigs, with a resultant saving in time and money on jig construction, and also increases production as much as 50 per cent in the drilling of sub-assemblies.

This attachment is shown on a machine in Fig. 18. It is used in conjunction with a special drill jig that is provided with countersunk holes to accommodate the conical shaped nose on the drill bushing held in the bottom of the attachment. The drills, assembled in quick-change chuck adapters and identified by a standard hole-size color code, are kept in a tray with their respective bushing adapters, as shown in Fig. 19. Each of these complete units can be inserted in the drill-head attachment and fastened by a half turn of the bushing adapter. The drill and chuck adapter are then lifted and locked into the quick-change chuck.

This new method of jig drilling has reduced burring, increased drill life, and eliminated over 1400 drill bushings in the one jig shown in Figs. 18 and 20. This is a drill jig for the main beam, and locates a total of 125 parts. It is used for drilling 1423 holes.

The production ideas here described and many others are playing an important part in reducing the number of man-hours necessary to build Lockheed planes. This type of tool design for production will continue to exert an important influence on the successful utilization of man-power. It will enable schedules to be met and high production to be maintained, in spite of the man-power shortage.

Air Gages Speed Inspection of Precision Work

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Westinghouse Electric & Mfg. Co.
East Springfield, Mass.

Fig. 1. Air Gages Used for the Rapid and Accurate Measurement of Bores

Fig. 2. Internal Air Gage with Attachment for Making External Measurements

PRECISION inspection of parts, and their classification in groups that are of uniform size within accuracy limits of 0.0001 inch for selective assembly, are being greatly simplified through the use of air gages of identical design, in the production line and the inspection department. Ingenious attachments have been devised for these air gages to give quick, accurate measurements of inside and outside dimensions of even complicated parts such as gears. The dependability of these gages has been an important factor in machining parts to close tolerances on a mass production basis.

Experience has shown that the air gage has many practical advantages for checking precision work. In turning the work on the spindle of the air gage, the indicator needle does not flicker or oscillate and thus confuse the operator. Bores of cylinders as long as 8 inches with a limit of 0.0005 inch for taper and out-of-roundness can be rapidly checked. The cylinders to be gaged are lined up on a bench in lots of from twenty-five to thirty, and checked for size by using a portable extension designed for use on any air gage. The spindle life of air gages is very satisfactory when the gages are used for parts made of ordinary materials, such as steel, brass, aluminum, etc. When parts of exceptionally hard materials are to be gaged, best results are obtained by furnishing the air-gage spindles with Carboloy inserts, which will satisfactorily withstand the wearing action imposed upon them.

Any size hole can be measured by using an air-gage spindle of the proper size. Each size of hole to be gaged requires a spindle that is properly calibrated for that size. Experience has shown that it is advantageous to use the same type of air gage on the production floor and in the inspection department. This eliminates arguments that previously arose whenever the gages used in the shop or production depart-

ment did not agree with those employed in the inspection department.

The problem of measuring the actual size of small gears was solved satisfactorily by employing a modified form of air gage. Previous to the use of the air gage, trouble was experienced through difficulty in obtaining uniform measurements. All kinds of gages and blocks were employed in an effort to obtain uniform measurements. Various types of indicator gages were used, but the results were still unsatisfactory. Even the same person measuring these gears with the same devices obtained different readings.

Since air gages have been so successful in measuring internal dimensions, it was decided to apply the principle to the gear gaging problem. Special attachments connected to a regular internal air gage were found to give excellent results. This ended the differences of opinion between the production and inspection departments regarding the gear measurements, since the air gages have no part that actually touches the surface being measured, a factor that was mainly responsible for the different readings obtained with the types of gages previously employed. Parts to be gaged on external surfaces can be spun around or revolved on this modified type gage without affecting the positive readings. Thus the air gage has proved satisfactory in making external, as well as internal, measurements of precision parts.

A desirable feature of this gage is that it will prevent over-size parts from getting past the inspector. Even if the work being measured is 0.0001 inch over size it will not fit the gage. A gage of this type which has been in daily use for almost a year is still giving accurate readings. There is no work contacting point on the gage to be worn, and it requires only a few seconds to adapt the gage for measuring a different size.

In general, the air gage is well suited to factory use. It is simple in design, can be read by anyone without mechanical knowledge, is easy to adjust, has no moving parts to get out of order, and requires no servicing. The gage is not affected by vibration or weather conditions. Its readings are very constant, and there is no question in the operator's mind whether the correct reading is, say, 0.0001 or 0.0002 inch. The dial is graduated to a tenth of a thousandth inch, and has a range of from 0.002 to 0.003 inch. When an inspector or operator becomes proficient in the use of these gages, he can readily distinguish the difference between rough and smooth bores by simply watching the movement of the indicator hand on the gage dial.

Setting up and Testing a Complete Mill for Welding Steel Pipe

RECENTLY the Yoder Co., Cleveland, Ohio, received an order from Russia for building two complete mills for the production of resistance-welded steel pipe in sizes from 1 1/2 to 6 inches. Each of these mills makes a production unit about a quarter of a mile long. It was necessary to erect and operate each entirely assembled unit in the Yoder plant before shipment to Russia.

While it is common practice to set up and test-run every individual machine in building this type of equipment, it is believed that this is the first time that the complete assembly of a pipe mill of this size has ever been made anywhere else than at the point of ultimate use. The necessity for erecting the entire mill in the builder's plant, however, afforded an unusual opportunity for men in the steel and tube products industries to inspect first-hand the latest type of high-production welded pipe-making equipment, complete and in operation.

Demand for Gears Continues to Increase

The volume of sales of the gearing industry, as represented by the members of the American Gear Manufacturers Association, showed an increase of 9 per cent in June, 1944, compared with May. These figures include only what is generally known as industrial gearing, and not turbine or propulsion gearing.

Maintaining War Production by Machine Tool Lubrication

By ALLEN F. BREWER, Technical and Research Division
The Texas Company, New York City

WITH the tremendous production demands in the war equipment industries, there is always the possibility that the lubrication of machines and auxiliary equipment may be neglected. In many instances, the operators work on a piece-work basis, in which case, if they are responsible for the lubrication of their machines, they are reluctant to take time off for what seems to them an unimportant detail. In many plants, the maintenance crews have been reduced because of the draft and other war conditions, and there is always the temptation to overlook the importance of the regular lubrication of the machines.

Yet nothing contributes more to steady operation and high continued output than the right kind and the right amount of lubrication. Adequate maintenance and lubrication means that machines are not shut down for repairs, wear is reduced, and longer machine life insured. The accuracy of the machine is increased for a longer period by the reduction in the rate of wear, and all around, the satisfactory performance of a machine is insured by its proper lubrication as in no other way.

In machine tools, the important elements to be lubricated are gears, bearings, slides, guides, and the ways of columns and beds.

Primary Considerations in Gear Lubrication

Gear lubrication depends upon the design, construction, and location of the gears with respect to other parts of the machine. A sufficient and continuous film of lubricant must be supplied to the wearing surfaces of the teeth. This can be done by means of either fluid oil or grease. The proper lubrication of gears that are subject to reversal is of particular importance, not only in order to eliminate noise, but because the lubricant functions as a buffer or shock absorber. The reduction of these shocks at reversal obviously promotes greater durability of all wearing parts adjacent to or affected by the gears.

A medium-bodied straight mineral machine oil will usually serve best where splash, bath, or pressure lubricating systems are installed. The viscosity may range from 300 to 500 seconds Saybolt universal at 100 degrees F. An oil of this character can generally be employed on other moving parts besides gears.

Exposed gears or those not contained in oil-tight gear casings require that the lubricant be applied to the teeth by hand-swabbing. Under such conditions, a heavier or more adhesive gear lubricant must be used; otherwise, the lubricating film may not function for a long enough period to prevent metal-to-metal contact. The lubricant must be such that it will stick tenaciously to the teeth, resist the action of centrifugal force, and not be too greatly affected by dust or dirt.

A variety of products are available for such service, ranging from the semi-fluid type of automotive gear lubricants to the heavier products used extensively on excavating, steel mill, and mining machinery. Too inert and viscous a lubricant, however, would not be suitable for the precision gear trains in many machine tools, because, while it would lubricate, it would unduly increase the power required to operate the gears. The selection of a lubricant for exposed gears, therefore, must be given careful thought. The idea is to select as light or fluid a lubricant as possible, commensurate with the tooth pressures involved and the fulfillment of the other conditions mentioned that are met with in the case of exposed gears.

Lubrication of Machine Tool Bearings

The simplest lubrication problem is presented by prelubricated anti-friction bearings. The grease-lubricated ball or roller bearing, prepacked at the time of assembly, is a pronounced factor in reducing lubrication difficulties in modern machine tools. Such bearings require no lubrication after installation, and hence, the chance of overgreasing or damaging the bearing seals is eliminated.

Plain bearings, however, present a definite lubrication problem. Abnormal friction will develop if lubrication is insufficient or if the lubricant is unsuitable. Automatic lubrication now so frequently used is, therefore, a decided advantage. Central oiling systems are available at present with leads to the more important bearings and slides. Centralized force-feed lubrication is well adapted to lathes, planers, and milling machines.

On heavy-duty high-speed machine tools, the pressures on some of the bearings are exceptionally high. Where clearances are fairly generous and an oil of sufficiently high viscosity is used, the lubricating film will generally be thick enough under ordinary conditions to prevent abnormal wear. Too great clearances, however, may prevent obtaining the accuracy required in the work to be machined. In such cases, pressure lubrication is especially valuable. Furthermore, it enables a lighter grade of oil to be used, particularly where the pressure on the lubricating system is sufficient to assure complete penetration between all moving parts.

Centralized lubrication must be planned in accordance with the nature of the work required, the bearing pressures, and the type of machine being lubricated. On milling machines and planers, the installation of oil reservoirs of sufficient capacity or mechanical force-feed lubricators simplifies the lubrication problem.

Complete flood lubrication has been found useful on many machine tools. In such cases, the machines are equipped with self-contained oiling systems, the lubricant being pumped to the bearings and slides from an oil reservoir.

Relation between Load and Oil Viscosity

Slides, vees, and ways can be lubricated effectually by automatic means. A formula has been proposed in which the relation between the weight of the work and table, the width of the V-bearing, and the table length is used to calculate the bearing load. This formula can also be used for determining the viscosity of the oil to be used. The viscosity should be sufficient to maintain an adequate film thickness of from 0.0005 to 0.002 inch. In the formula below, the weight of the table and the work equals W, in pounds; the width of the V-bearing equals V, in inches; and the length of the work table equals L, in inches. Then

$$\frac{W}{V \times L} = \text{bearing load per square inch}$$

Experience indicates that, for bearing loads below 10 pounds per square inch, an oil viscosity of from 300 to 500 seconds Saybolt universal at 100 degrees F. is suitable. For heavier bearing loads, it would be advisable to use a somewhat heavier oil.

General Considerations in the Selection of Lubricants

The number of lubricants employed in a plant should be kept to a minimum. This becomes all the more important in wartime when the demands on available lubricants are excessively high. Hence, if possible, a grade of oil should be selected that serves all wearing parts, whether the lubricating system is of the pressure, splash, or individual oil-cup type. If the possibilities of leakage are not too great, a machine oil having a Saybolt universal viscosity ranging from 300 to 500 seconds at 100 degrees F. will usually be found suitable.

Grease lubrication is generally confined to the individual servicing of bearings. Grease is applied by compression grease cups, pressure grease-gun fittings, or by multiple-fitting lubricators which render the application of the grease more or less automatic. Grease lubrication should be used when the bearing design or construction is such that oil would drain or leak excessively, causing waste of lubricant. Grease-lubricated bearing rollers on the cross-slide guides of heavy-duty turret lathes have been found advantageous.

Greases are selected according to their stability, lubricating characteristics, and ease of application. A grease should remain, as nearly as possible, in a state of perfect stability, with a minimum tendency toward oil separation; otherwise, the oil content may be dissipated by leakage and the remainder of the grease composition will not give adequate protection to the bearings.

Hydraulic Oils

Since power transmission by oil hydraulic means is now adopted on a large number of machine tools, the selection of oil for hydraulic power transmission has become an important item. Only oils of high quality should be used for this purpose. They should be entirely free from abrasive or contaminating foreign matter, and must be protected from dirt or dust when in service. For oil hydraulic control,

therefore, machine tools should be provided with suitable oil filters as part of the hydraulic system. When a new machine is put in service, all piping and accessory parts should be very carefully cleaned.

Another outstanding characteristic required in hydraulic oils is resistance to oxidation and to carbon formation. This affects the durability of the oil. Viscosity is only of importance as an indication of the relative fluidity. According to the type of hydraulic system, the viscosity may vary all the way from 100 to 1200 seconds Saybolt universal at 100 degrees F. When pumping pressures and operating temperatures are high, heavier oils should be used.

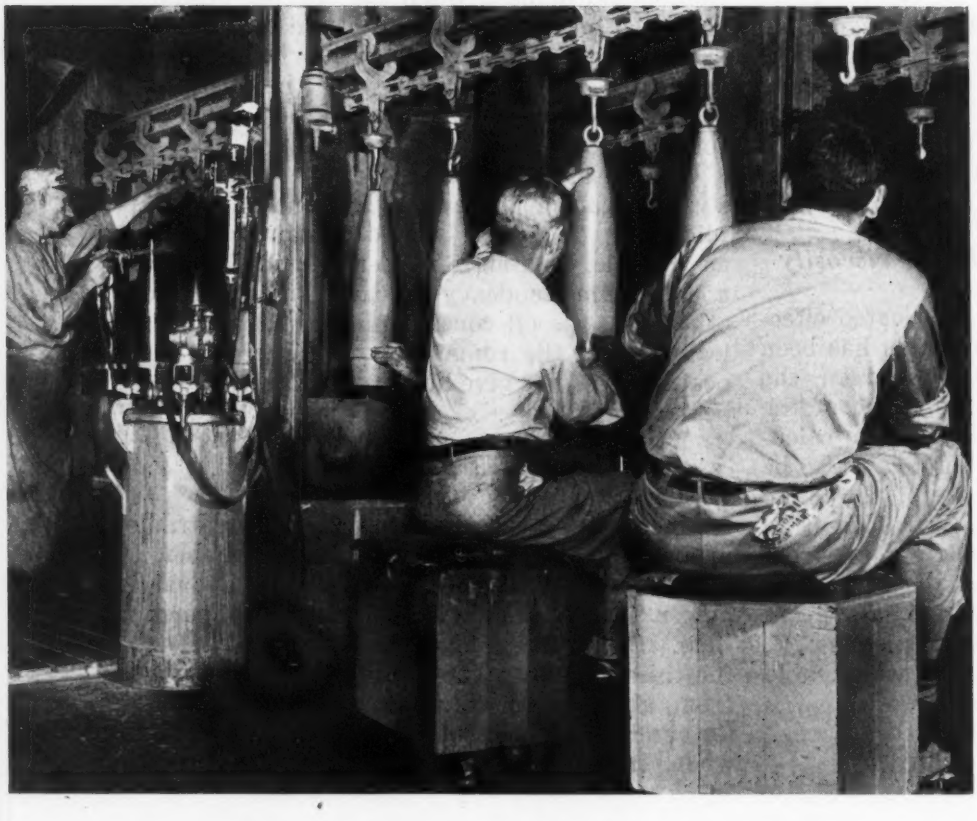
Lubrication of the pump and motor mechanisms in an oil hydraulic system is maintained by allowing a certain amount of oil leakage. There is no loss of oil, however, for the oil that lubricates is drained back into the oil reservoir of the system to be used again.

Air in an oil hydraulic system is a detriment. It interferes with smooth operation. For this reason, when the system is filled, care should be taken to see that it is entirely filled with oil and as free as possible from air inclusions. Air is most likely to enter the system when oil is added, although air leakage can also take place between the reservoir and the pump or at some high point in the system. Leaky packing or a restricted pump intake, due to sludge accumulations, may also lead to air leaks.

It has been found that the entry of air at the time the system is filled can be materially reduced by pouring the oil very slowly and straining the fresh oil through a few layers of cheesecloth. Air relief valves are helpful at high points in the system. The removal of air can also be accelerated by locating a baffle plate in the oil reservoir. This gives the air bubbles a better chance to rise. Lighter oils are more easily freed from air than heavier oils.

* * *

Our most important post-war problem—on which the solution of all others depends—is the maintenance of freedom of individual enterprise.



Final Operations on 155-millimeter Shells before Shipping from the Willys-Overland Motors Plant Consist of Painting the Shells Inside and Lacquering Them on the Outside while Overhead Conveyors Carry the Shells Past Paint Spray Booths

Grinding Accurate Cam Surfaces

Points to be Considered in Grinding Intentionally Out-of-Round Surfaces, Such as Cams, Eccentrics, and Elliptical or Relieved Pistons

By PAUL STONER
Landis Tool Co., Waynesboro, Pa.

THE grinding of intentionally out-of-round surfaces, such as cams, eccentrics, and elliptical or relieved pistons, is essentially cylindrical grinding with added complications and difficulties because of the high degree of accuracy and surface quality generally required and the irregularity of shape encountered. To get satisfactory results, it is necessary to observe the same precautions that are observed in fine precision cylindrical grinding, as well as a few additional ones. The causes of faulty grinding and the corrective methods are also much the same, with a few added ones.

All of these intentionally out-of-round surfaces—which, for convenience, we shall refer to as "cams"—may be ground on special-purpose automatic cam-grinding machines, or on straight cylindrical or universal machines equipped with cam-grinding attachments. Internal cams may be ground on internal or universal machines equipped with cam-grinding attachments. Whatever type of machine is used, it is essential that it be of rigid, accurate construction and maintained in as nearly perfect condition as possible.

Vibration is one of the most common causes of faulty cam grinding. If it is due to general building vibration, it may be necessary to provide heavy grinders with separate foundations that are independent of the surrounding floor. With light grinders, it may be sufficient to tighten or loosen the anchor bolts, or to apply vibration dampeners. Sometimes it is best to move the machine to a better location.

Other causes of vibration, due to poorly designed or inadequately maintained machines, are loose wheel-spindle bearings; wheel-spindles

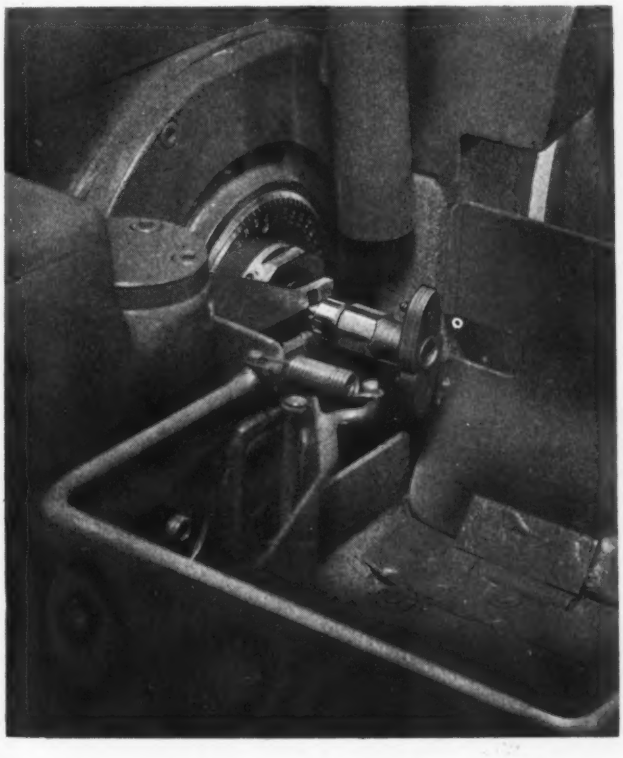


Fig. 1. Grinding Airplane-engine Distributor Cams on a Plain Hydraulic Machine Equipped with Cam-grinding Attachment

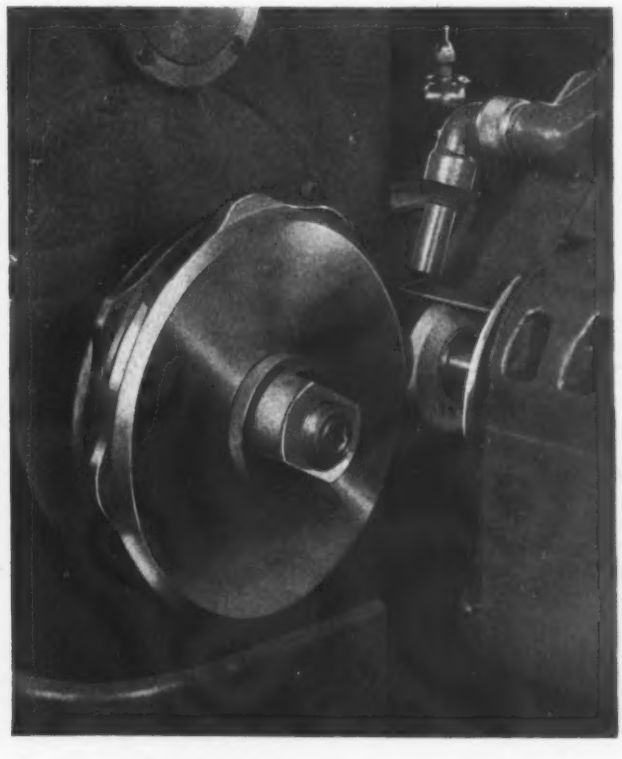


Fig. 2. Grinding Radial Airplane-engine Cams on a Special Radial Cam Grinder, Using Small Wheel because of Concave Curves on Cam

sprung or out-of-round; couplings out of alignment; wheel, motor, and spindle assembly out of balance; uneven belt tension; metal belt-lacing on spindle drive (which should never be used for precision grinding); idlers loose or out of balance; backlash in driving gears; faulty thrust bearings; loose pulley on spindle; work centers or rests out of true or improperly lubricated; and improper adjustment of brake on cam attachment. Any of these will cause chatter marks on the cams.

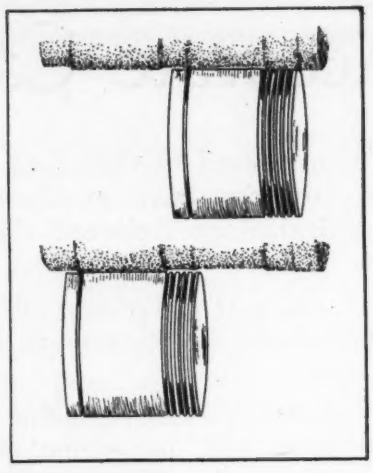


Fig. 3. Employing a Wide-faced Wheel, by which Pistons are Both Cylindrically and Relief Ground

To generate the cam profile, the work is held in a cradle which is moved to and from the grinding wheel by means of a master cam and roller. The master cam is designed from a model of the cam to be made. The model is laid out on the drawing-board ten to twenty times actual size. The cam lifter is then laid in for every half degree of rotation and the lift marked on the lay-out and charted. From this data, the model cam is fabricated by hand shaping and grinding operations.

The model cam is then used in generating the master cam by grinding. In this operation, it is important that the diameter of the roller which is in contact with the model cam correspond to the mean diameter of the grinding wheel which will be used for grinding the work in production. The diameter of the grinding wheel used for finish-grinding the master cam must be, within reasonably close limits, equal to the diameter of the roller which will be in contact with the master cam in production.

It is evident that the master cam and the model cam from which it is made must be highly accurate. What is not so evident, and, therefore, a common cause of inaccurate cams, is that the diameter of the grinding wheel used in production must be reasonably close to the diameter of the roller used in generating the master cam. The reason for this is readily appreciated.

In general practice, however, it is found that a certain amount of tolerance in wheel diameter is allowable. For example, if a master cam is generated with a 22-inch diameter roller, the grinding wheel used in actual production of the cams may, when put into service, have a diameter of 24 inches and may be used until it has worn down to 20 inches. It should then be discarded so far as grinding those cams is concerned. Wheels used for cam grinding are often applicable to the grinding of other precision cylindrical parts; or, if a shop produces various types of cams, it is sometimes possible to transfer a worn wheel to another cam grinder where its size suits the work being ground.

In cam grinding, it is wise to use as large wheels as possible, because the smaller the wheels, the greater will be the error in cam contour for the same amount of variation in wheel diameter. In grinding a cam, part of the contour of which is concave, it is obvious that the radius of the grinding wheel must be less than any radius in the concave part of the cam.

For example, the concave surfaces on radial airplane cams require the use of grinding wheels which range in diameter from 2 1/8 to 4 inches. With these wheels, the best practice is to keep the wheel diameter to within 3/16 inch, plus or minus, of the diameter of the roller used in generating the master cam. The diameter of the wheel used for grinding the master cam is held to within 1/32 inch—in some cases, 1/64 inch—of the diameter of the roller which is in contact with the master cam in production.

Relief grinding of pistons is, in effect, cam grinding. After the piston has been cylindrically ground with the swinging bracket locked in a

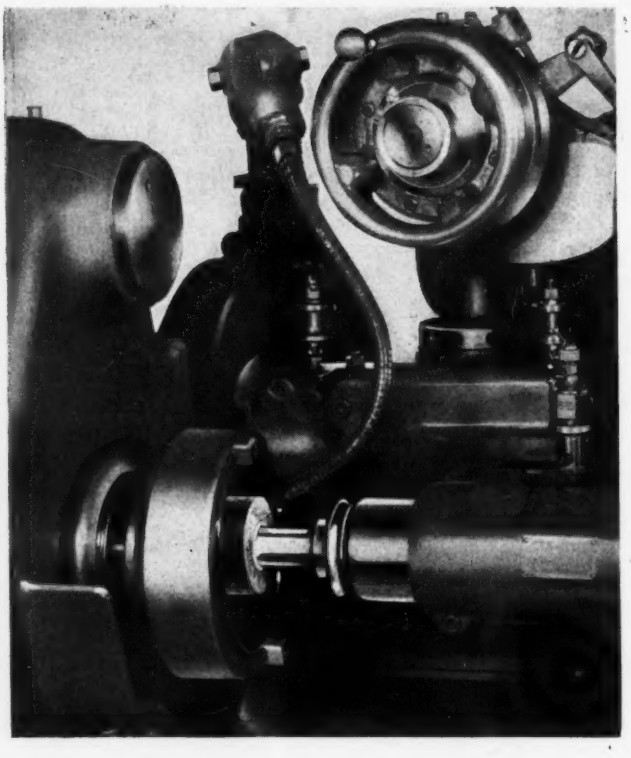


Fig. 4. Grinding an Internal Cam on a Hydraulic Universal Machine Equipped with a Cam-grinding Attachment

fixed position, the relieved portion across the pin-holes is cam ground, giving that section an elliptical shape. This operation may be done on either of two types of machines. One method is to use a plain hydraulic grinder equipped with a cam-grinding attachment. The entire surface is first given a cylindrical rough-grinding, removing about 0.014 inch at a high traverse speed, followed by a finish cut which removes 0.001 inch at a reduced traverse speed. Then the cam-grinding attachment is thrown in and the relief is ground, removing about from 0.004 to 0.020 inch on the radius.

Another method utilizes a formed wheel and plunge-cut grinding on a plain hydraulic grinder equipped with an integral cam-grinding attachment. As indicated in Fig. 3, a wide-faced wheel is used, which is formed so that the piston may be both cylindrically and relief ground by changing the position of the work-table. The piston is first cylindrically ground by the right-hand side of the wheel face; it is then moved to the left-hand side of the wheel face, where it is relief ground after engaging the cam-grinding attachment. Great precision is required in both the circular and elliptical sections.

As with other machines or attachments used for cam grinding, if more than one size or design of cam or piston is to be ground, the machine can be equipped with several sets of master cams, so that the roller can be shifted longitudinally to engage the proper set of masters.

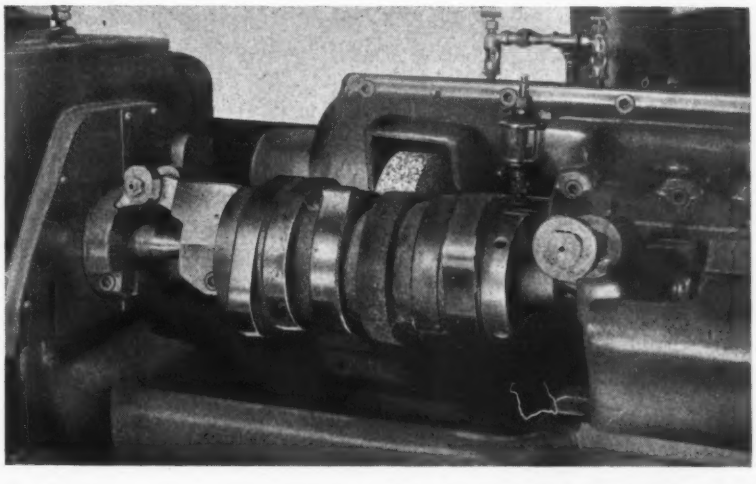
Essentially, the same methods are used in grinding loose cams, except that they are mounted on stub arbors or holding fixtures supported from one end only.

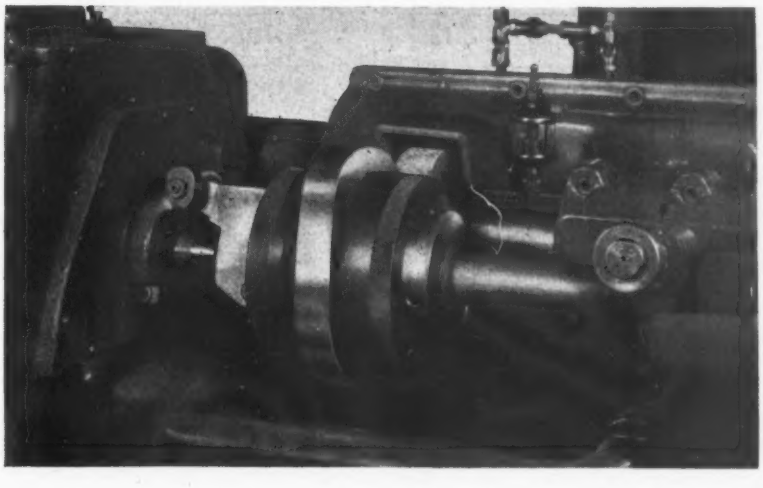
Wheel and Work Speeds and Wheel Selection for Cam Grinding

For external cam grinding, wheel speeds should be from about 5000 to 5500 surface feet per minute, whether the wheel bond is vitrified or resinoid. The slower speeds give a better finish. For internal cams, somewhat lower speeds are used.

Automotive cams should be rough-ground at work speeds of from 30 to 60 R.P.M. and finish-ground at about half the roughing speed. Re-entrant, that is concave, curves are ground at about 5 to 15 R.P.M. for roughing and from 2 to 6 R.P.M. for finishing, depending upon the size and contour of the cams.

It is essential that the wheel be properly dressed. A fine spiral mark on the cam surface may indicate that the diamond is cracked or broken; that the dressing may have been done at too rapid a traverse; that the diamond may penetrate the wheel face too much; or that the tool may be dwelling in contact with the wheel. Be sure that the tool is set downward at an angle of from 5 to 10 degrees. It is good practice to turn the diamond in its holder at regular intervals. Another important point is to be sure that both the holder and the tool are held tightly.





Figs. 5 and 6. These Illustrations Show Two Entirely Different Types of Cams being Ground on the Same Machine. Master Cams for Both Sets are Mounted on the Work-spindle. The Only Adjustment Required when Changing from One Job to the Other is to Shift the Cam Roller from One Master Cam to the Other, which can be Done in an Instant

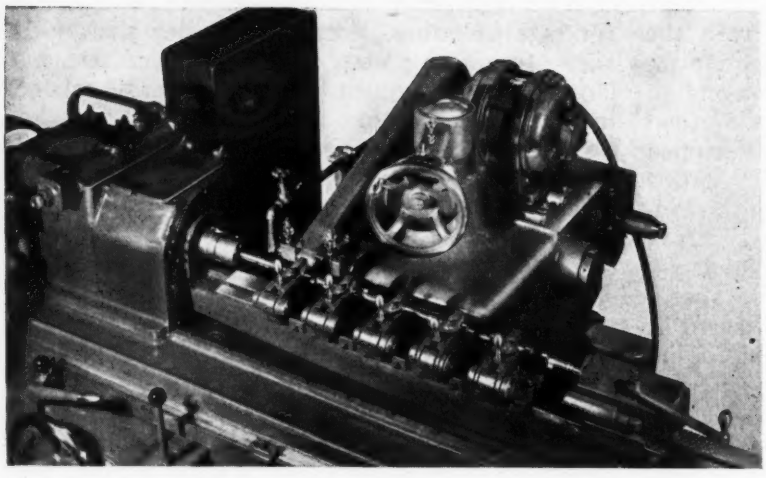


Fig. 7. Hydraulic Cam Grinder Adapted to Grind Concave Type Cams with a Small Wheel

Unsatisfactory results may come from using the wrong wheel for the job. Too hard a grade of wheel may cause chatter marks or burning, and it will cut too slowly. Too soft a wheel may cause wide, irregular marks of varying depth and grit marks. A wheel of too coarse a grit may cause narrow and deep regularly spaced scratches on the surface. Too fine a grit may cause the wheel to load and glaze, which, like too hard a wheel, may cause burning and chatter, as well as slow production.

Unfortunately, it is not possible to give exact wheel specifications for a cam-grinding job without knowing all of the conditions. Even then, nothing but actual tests of various wheels under operating conditions will indicate the best possible wheel for the job. The engineers of the grinding wheel manufacturer whose wheels are to be used can be helpful in selecting the wheel for the cams and conditions involved.

The suggestions in the accompanying table should be useful in narrowing the field of choice, but are not to be taken as final recommendations.

Film on Tooling for Better Grinding

A motion picture of especial interest to production engineers, tool and fixture designers, grinding-room foremen, and others responsible for grinding production has been developed by the Bryant Chucking Grinder Co. The film, entitled "Tooling for Better Internal Grinding," covers many problems encountered in the tool-room and in mass production. It shows the importance of tooling for small-lot production grinding, standard tooling adapted to production work, and special tooling which enables several operations to be performed in one chucking.

The film is available to engineering societies, foremen's groups, and similar organizations without charge. It is 1600 feet long, 16-millimeter size. This is a sound motion picture and requires a sound projector; silent projectors cannot be used. The time required for showing is forty minutes. For further information, address Sales Department, Bryant Chucking Grinder Co., Springfield, Vt.

* * *

Meehanite Film Available

A 16-millimeter color motion picture in two reels, without sound, entitled "The Flow of Metal into Molds," has been made available to societies and industrial groups by the Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y. The film shows the action of molten metal as it is poured into molds of various sizes, shapes, and types for the making of castings.

Table for Guidance in Selecting Wheels for Cam Grinding

Material and Operation	Abrasive	Grit Size	Grade*	Bond
Hardened Steel				
Roughing	Aluminum oxide	70	4–6	R. Resinoid
Finishing	Aluminum oxide	60	10	KR. Rubber
Roughing and Finishing				
Hand machines	Aluminum oxide	70	4–6	R. Resinoid
Automatic machines	Aluminum oxide	70	4–6	R. Resinoid
Cast Alloy Steel				
Roughing and Finishing				
Hand machines	Aluminum oxide	70	4	R. Resinoid
Automatic machines	Aluminum oxide	70	4	R. Resinoid

*The grade symbols are those used by the Carborundum Company.

The Application of Arc Welding to Turret Lathe Production

A Description of Methods Employed in the Application of Arc Welding to Machine Tool Building, as Set Forth in a Paper Awarded One of the Prizes in the Recent Contest Conducted by the James F. Lincoln Arc Welding Foundation

By HENRY A. OLDENKAMP, Welding Consultant
Warner & Swasey Co., Cleveland, Ohio

IN discussing the application of welding to turret lathe production, it is well to recognize the limitations of welding before investigating where this method of fabrication can best be used. In this way, much time can be saved by eliminating immediately the thought of designing parts for welding which, at present, it does not seem practicable to fabricate from welded steel.

There are a number of reasons why it is not practicable to "weld everything"; among these is the poor vibration absorbing characteristics of steel, resulting in tool chatter and poor finish. Another point to be considered is that cast iron has good bearing qualities, whereas steel will gall in some instances unless a properly heat-treated alloy steel is used. In many cases, this disadvantage can be overcome by using cast iron or other bearing metal inserts. However, the expense involved may offset the savings obtained through welding.

A further disadvantage with a welded design is that steel is more difficult to machine than cast iron. The additional machining time must be taken into account when making comparative cost estimates as between cast and welded parts. However, as will be pointed out later in this article, it is often possible to offset this disadvantage by eliminating some of the machining operations.

These difficulties have been mentioned first, because the usual tendency, when one realizes the great possibilities of welding, is to become over-enthusiastic about the process and to overlook the obstacles mentioned.

Advantages to be Gained by Welding

On the other hand, there are many advantages. First, steel is more than twice as "stiff" as cast iron. Steel has a modulus of elasticity of 30,000,000 as compared with 12,500,000 for cast iron. A simple mathematical analysis will show that great savings in weight can be made by using fabricated steel instead of cast iron, still retaining the same stiffness and strength. Obviously, in order to make full use of this advantage by changing from cast iron to steel, it is desirable to keep the comparative depths of the respective sections the same as before and change the widths wherever possible. By so

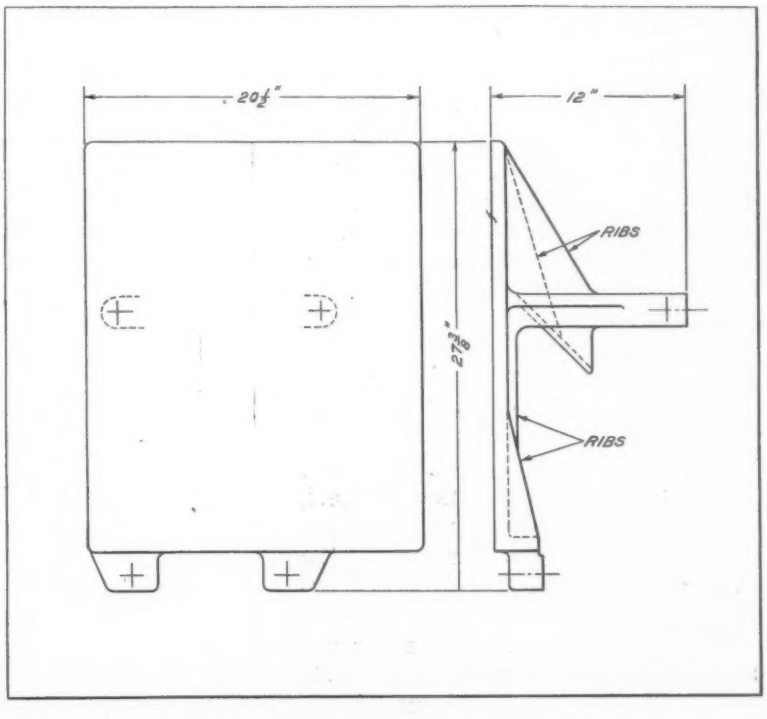


Fig. 1. Original Cast-iron Motor Base

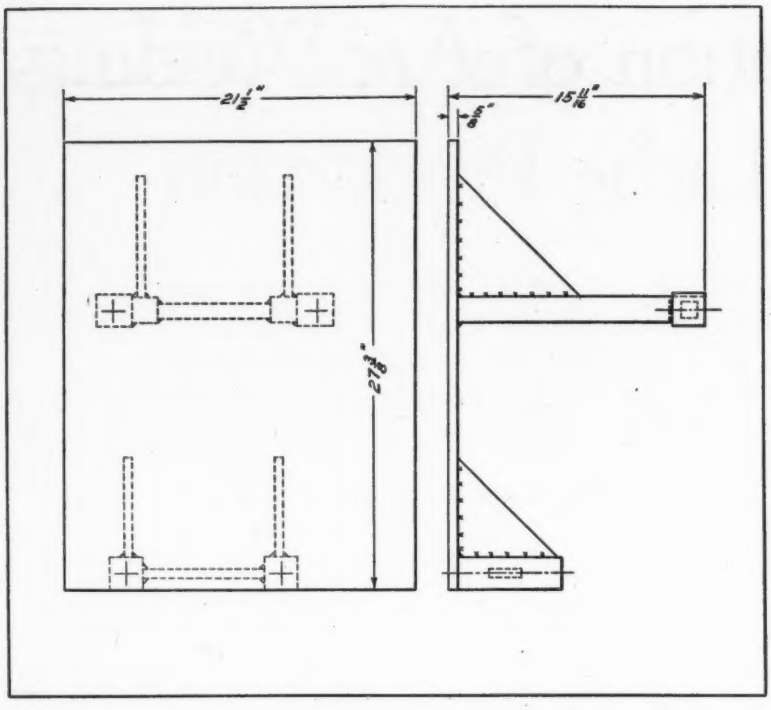


Fig. 2. First Redesign of Motor Base Shown in Fig. 1 for Welded Construction

doing, it is possible to reduce the weight of a given section by almost 60 per cent instead of by 25 per cent, as would be the case when the widths are kept equal.

In addition to weight savings, the use of fabricated steel will often provide more room in the machine itself than could be obtained with other methods of construction. Close clearances can often be avoided by the use of fabricated steel construction.

Another important item is that of cost. A good grade of cast iron costs in the neighborhood of 8 cents per pound compared with about 4 cents per pound for steel. Consider, as an example, a 100-pound casting costing $8. In most cases, this same part can be made out of 50 or 60 pounds of steel and still retain the same strength and rigidity. However, to be on the conservative side, say that the steel part will weigh 75 pounds. The cost would then be $3. It will be noted that $5 is left with which to fabricate the steel, perform any necessary machining operation, and overcome any of the bearing disadvantages already mentioned.

There is no general rule for the amount saved that will apply in all cases. The cost of each part must be figured individually, starting with the basic cost figures mentioned. In most cases, if a plant is properly equipped for production welding, savings of from 15 to 25 per cent can be made by the use of fabricated steel in place of cast iron.

In some cases, the use of rolled steel actually decreases the amount of machining required on a part. Combining several parts that were formerly bolted together into a welded structure eliminates the necessity for drilling, tapping, and milling the faces to be bolted. Frequently, rolled steel, as obtained from the mill, provides a surface smooth enough for motor mountings, brackets, electrical controls, etc., whereas it was formerly necessary to mill or plane mounting surfaces on the rough castings.

Obviously, the use of fabricated steel in new designs eliminates pattern and pattern-storage costs. Further, since the steel parts are lighter in weight than the corresponding cast-iron parts, the steel parts are easier to handle in the shop. In some cases, the parts may be reduced in weight to such an extent that they can be manipulated by hand, thereby saving the tying up of a crane.

A plant must be properly equipped to do production welding in order that the savings out-

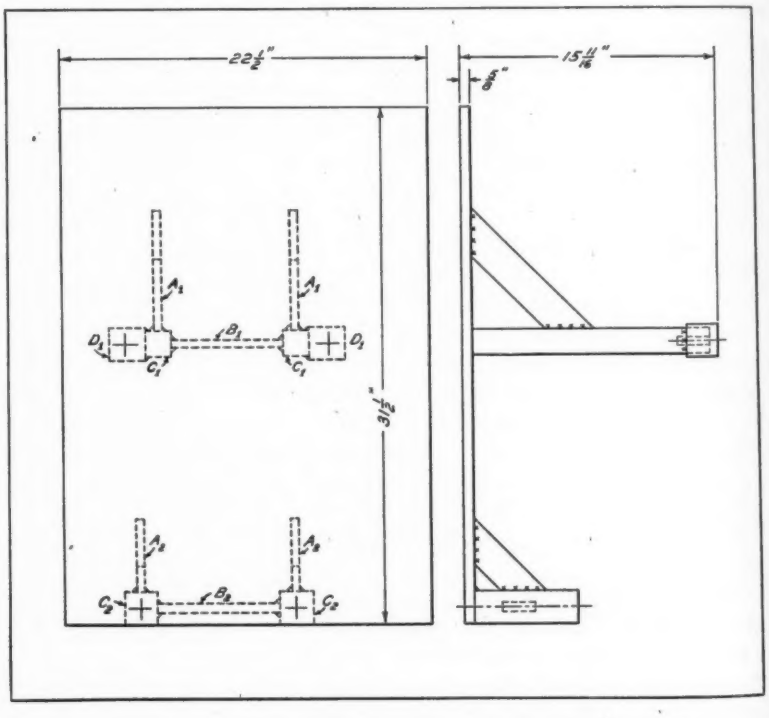


Fig. 3. Final Method of Fabricating the Motor Base Using Welded Sub-assemblies

lined may be made. An out-of-date welding department can make welding costs go too high and prove very discouraging to the designer who wants to show a cost advantage. Not only must the welding machines be up to date, but the forming and cutting equipment incidental to the welding process must be available. A careful study must be made of the welding rods used to make sure that the proper sizes and types are selected for each job.

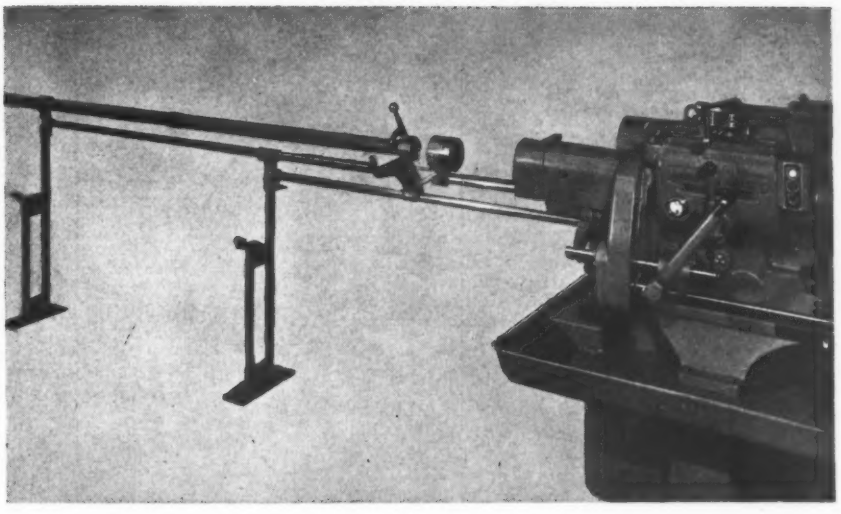


Fig. 6. Welded Bar-feed Stand Shown in Fig. 5

A definite personnel development program is helpful in a welding department. The welding supervisor should have meetings with all the operators collectively at least once a month. The purpose of these meetings is to stimulate the men into thinking about methods of increasing their efficiency and to bring out ideas for new designs. At these meetings, the welding supervisor should bring to the men new ideas and methods introduced by other companies, illustrating his talk with slides or even motion pictures, if possible.

A proper attitude on the part of the welding personnel must be maintained. Since welding is a relatively new process, many ideas for new designs originate in the welding department. Each man in the department must be open-minded and willing to try new procedures and new methods that speed up the process and often make the job easier for himself. Frequently, welding operators who have only a little experience are quite suitable for production welding, because they usually keep their minds open to suggestions.

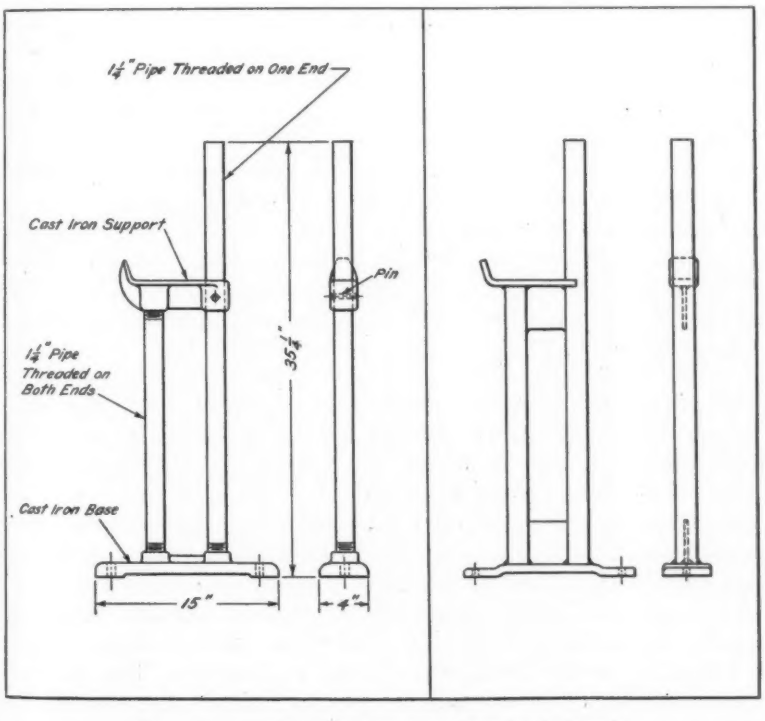


Fig. 4. (Left) A Cast-iron Bar-feed Stand
Fig. 5. (Right) Welded Steel Bar-feed Stand

Jigs and Fixtures Used in Welding

The work can be made easier and production can be speeded up considerably by the use of simple jigs and fixtures for holding the parts to be welded. Fig. 3 is an example of this. The parts marked *A1*, *B1*, *C1*, and *D1* can be welded as a sub-assembly after first being tack-welded in a small fixture. Likewise, *A2*, *B2*, and *C2* can be welded as a sub-assembly. The sub-assemblies are laid on a 5/8-inch thick plate and tack-welded in place, using a simple locating fixture, and they are then welded to the plate. This method not only provides a quick way for locating the parts, but the sub-assemblies are easy to handle and can be welded by a man at the bench.

In the old method, where all the parts were first tack-welded together on the 5/8-inch plate, it was necessary for the plate to be lifted into various positions in order to make all the joints accessible, and, furthermore, two men were required on the job or one man and a crane. With the new sub-assembly method, it is only necessary to move the whole assembly after it has been completely welded. By the

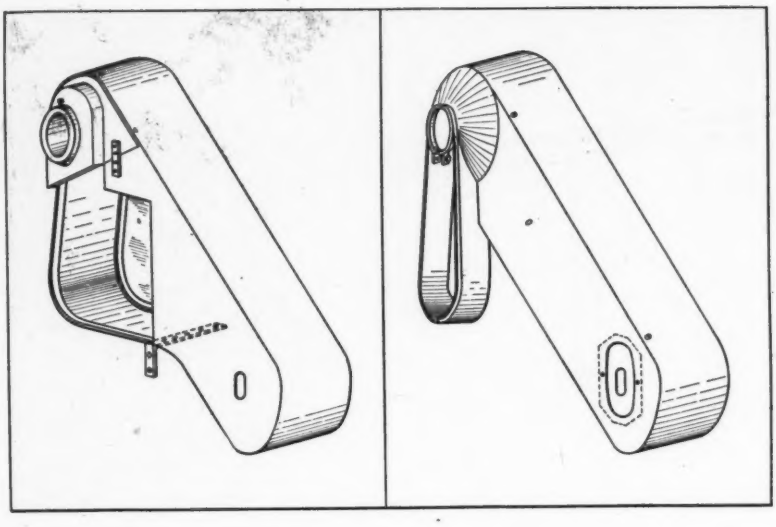


Fig. 7. (Left) Belt Guard before Redesigning for Welded Construction. Fig. 8. (Right) Welded Belt Guard

use of this method, the time for welding this motor base has been reduced from one hour each to thirty-five minutes.

Type of Material Selected for Welded Work

In designing for arc welding, care should be taken in the choice of the material to be specified for the parts to be welded. In most machine tool shops, the tendency is to use steel that machines the easiest, paying little attention to how readily the steel may be welded. It so happens that the best machinable steel is high in sulphur and is, therefore, difficult to weld at a high-production rate.

In one plant, X1315 steel was used for 2 1/2-inch diameter collars welded to coolant pans. In doing the welding, it was necessary for the operator to use a 5/32-inch light-coated electrode at about 100 to 125 amperes. The process had to be slow in order to "boil out" the sulphur from the weld metal as it was being deposited; otherwise, pin-holes would form that would cause leaks in the pans. A change to X1020 cold-rolled steel increased the machining time on the collars slightly, but the advantages in welding more than offset the machining difficulties. The operator was able to use a coated electrode at a much higher current, thereby reducing the welding time.

No figures are available as to just how much time was saved by the change in steel specifications, because the welding set-up was also changed for high-production welding. All in all, however, it originally took six minutes to do the work on each collar, including the set-up; the same job is now done in less than a minute.

Fig. 1 shows a cast-iron vertical motor base which was considered a well-designed piece of cast iron. Note that it was necessary to plane the face of the base because the rough casting was too uneven for the mounting of the motor on it.

While other changes were being made on the machine as a whole, it became necessary to redesign the base. The engineering department then decided on a welded steel base, as shown in Fig. 2. Later the size of the base was increased to accommodate larger motors and the control apparatus for the motors. It was then that the base already referred to in Fig. 3 was designed. Obviously, this base requires more material. However, the increase in material was somewhat offset by using 1/2- by 2-inch diagonal braces (*A1* and *A2* in Fig. 3) instead of the solid diagonal plate brace shown in Fig. 2. The actual welding time was reduced 28 per cent by using these diagonal braces, without decreasing the rigidity. In addition, by cutting down the amount of welding on the base, the warpage of the 5/8-inch thick plate was kept at a minimum.

The plate used for the motor base had a finish that was satisfactory for the mounting of the motors, and it was, therefore, unnecessary to plane the face of the plate, as in the case of the cast-iron base. The latter, weighed 210 pounds as compared with 171 pounds for the steel design in Fig. 3, which actually provides more space for mounting the motors and controls.

In total, a cost saving of 50 per cent was made by this motor-base change-over. In addition to this cost saving, the machines formerly used for finishing the cast-iron bases were released for other important work.

Another change to welded steel is exemplified in the bar-feed stands, Figs. 4 and 5. Fig. 4 shows the old stand and Fig. 5 the new design. The latter eliminates the necessity of threading the pipes and tapping the base and support. The pin in the cast-iron support obviously is eliminated. The long pipe in Fig. 4 had to be purchased with a certain tolerance on the outside diameter because it had to slip through the support. With the welded design, close pipe limits are not required and a less expensive grade of pipe can be used.

An accurate cost comparison is not available in this case because the old design was made in the Warner & Swasey plant, whereas the new design is being made by an outside welding shop. However, even with the welding shop's profit considered in the comparison, the cost of the new design of one particular stand is about the same as for the old. On another type of stand, there is a saving of from 15 to 20 per

cent. The tool cost has been included by the welding shop in the price per piece. While the saving referred to may not present a great cost advantage, nevertheless, the machines and labor tied up in making the old stands were released for other important work. This, in addition to the ability to purchase the new stands at an appreciable over-all saving, made the redesign worth while.

Recently, by eliminating certain parts on the belt guards for a turret lathe, several hours of assembling time were saved. Previously, the guard was assembled on a cast-iron spider, which, in turn, was assembled to the machine. By incorporating the spider as a welded sheet-metal part of the guard, the cast-iron spider was eliminated. The comparative designs are shown in Figs. 7 and 8.

The steel-strap bracket which was previously located in the assembly and then riveted to the guard was removed. The guards are now supported directly on the edges of the motor bases by means of screws through the holes in the back-plate of the guard.

The new belt guard design has reduced the over-all cost from 25 to 30 per cent and decreased the assembly time from four hours to one-half hour. Besides the cost advantage, the appearance of the guard is improved, better protection is provided for the belts, it is more convenient to get the belts on and off the sheaves, and standardization was made possible on one size guard to meet the needs of the majority of the drives and motors on the company's line of machines.

Other parts that have been successfully welded for a number of years are spindle racks used for handling shafts and spindles, oil and coolant pans, splash guards, apron covers, and special brackets. The welding of jigs and fixtures has steadily increased to a point where there is hardly a jig or fixture made in the shop that does not have some welding on it.

Other parts which can and probably soon will be welded to advantage are machine legs, brackets, yokes, chuck guards, handles, and beds. In times like these, it is difficult to interfere with the production set-up with new ideas. However, in view of the cost savings that can be made and the time that can be saved without sacrifice of quality, welding warrants serious consideration in all machine tool plants.

* * *

The Government policies during the past ten years have been largely directed toward making it difficult for the man of initiative who creates jobs to do his utmost in this direction. The man who creates jobs has been hampered and penalized. The entire effort of the Government seems to have been directed toward making it easy for the job seeker rather than encouraging the job creator, so that there would be plenty of jobs.

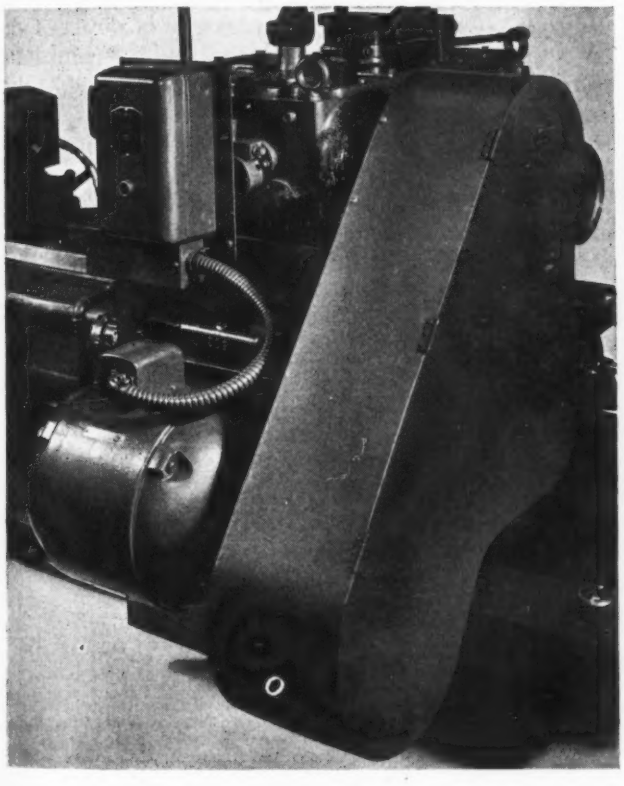


Fig. 9. Belt Guard Shown in Fig. 7, with Cast-iron Spider Fitted to Sheet-metal Guard

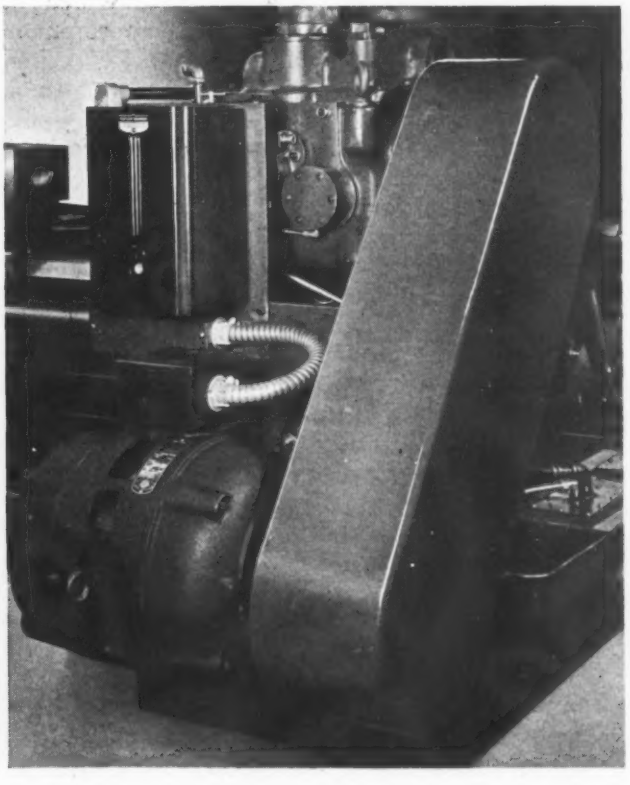


Fig. 10. Completely Welded Belt Guard Shown in Fig. 8, Fitted to the Machine

The Use of Rubber in Conjunction with Press Tools

Effective and Economical Methods of Producing a Wide Range of Sheet-Metal Parts — First of Three Articles

THIS series of articles will be limited to the consideration of the use of rubber in confined areas. "Free" rubber behaves altogether differently from confined rubber, and can be applied with success only in the production of parts with a relatively large area and with curves and contours needing correspondingly low pressure per square inch to effect deformation. Consideration of the use of "free" rubber is, therefore, omitted.

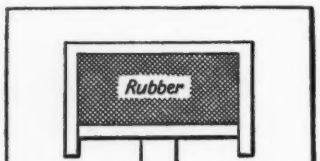


Fig. 1. Rubber, when Confined and Subjected to Pressure, Reacts in Every Direction

Generally speaking, when using rubber in conjunction with press tools, advantage is taken of a property which it possesses in common with fluids, namely, its ability to flow. Referring to Fig. 1, a quantity of rubber is placed in a cylinder and pressure is brought to bear upon it by applying a force to the ram in the direction indicated by the arrow *A*. Under these conditions, any such force must set up a resultant reaction on every surface with which the rubber comes into contact.

This fluid quality is augmented in the case of rubber by the additional property of cohesion, a factor which plays a vital part in the working of materials with the aid of rubber and dies. The ideal amount of cohesion suitable for the successful application of rubber is debatable. There is, however, a tendency on the part of manufacturers to use very tough or solid forms of rubber. In fact, the reinforcing of the rubber with fabric is considered by some to be the solution to many of the problems which have arisen in the adoption of this method of production.

Although fairly good results have been obtained by the use of very heavy rubber, they have, in the majority of cases, been dependent upon the resistance of the rubber to distortion. Such practice has limited possibilities, and the action on the rubber is severe, so that it deteriorates rapidly in quality, owing to the localized distortion which is set up.

Experiments tend to show that, provided a press capable of exerting up to at least two tons pressure per square inch over the whole area of the rubber is available, a fairly soft rubber with a good elastic property is an ideal medium for the majority of applications, and can be used with satisfactory results for such operations as punching and shearing, in addition to bending and flanging.

Cohesion of Rubber an Important Factor

The fact that rubber possesses the property of cohesion is one of the main reasons why it has proved suitable for press work. Referring to Fig. 2, at *W* is shown a cylindrical vessel, partially filled with a fluid and placed on a rigid bed. A piece of sheet metal is attached to a forming block, which, in turn, is secured to a plunger. Obviously, if the plunger is depressed, as seen at *X*, the fluid immediately surrounds the suspended plate, and in consequence, any applied pressure on the plunger has no effect on the plate, because the forces are neutralized, as shown by the arrows.

On the other hand, if the fluid is replaced by rubber, as at *Y* and *Z*, a similar movement of the plunger will result in the distortion of the plate, due to cohesion or resistance to free flow.

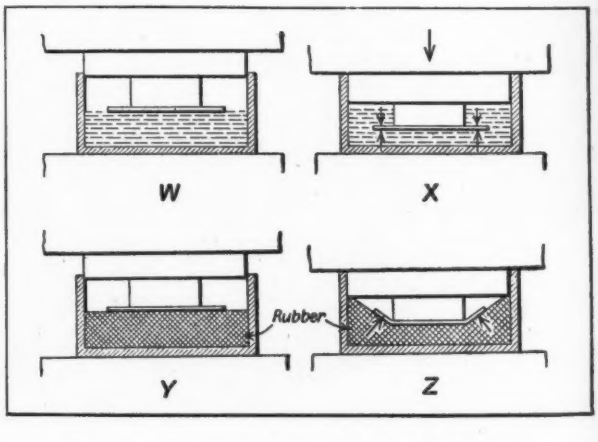


Fig. 2. Diagrams Contrasting the Behavior of a Liquid and Rubber under Pressure

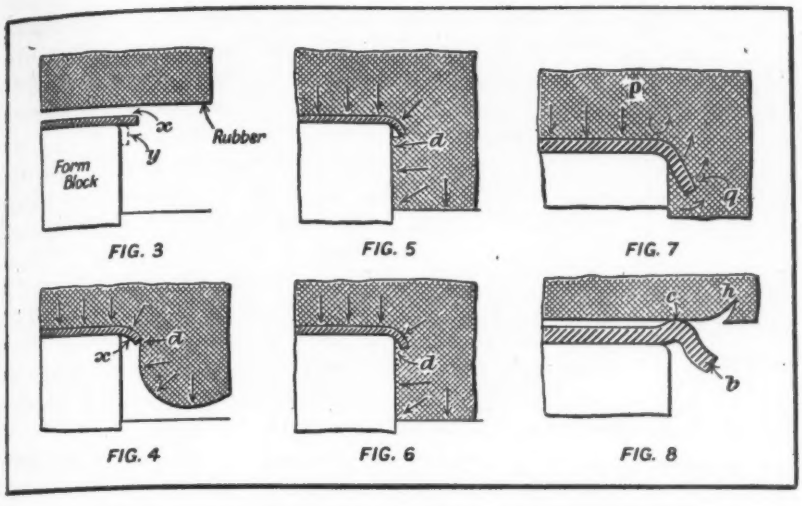


FIG. 3 FIG. 5 FIG. 7

FIG. 4 FIG. 6 FIG. 8

Figs. 3 to 8. Stages in the Bending of a Narrow Lip, Using Rubber with Unsuitably Designed Tools

The cohesive property of rubber, however, has its limits, and great care must be taken in the design of tools not to expect too much of the material; in other words, every assistance should be given to the rubber to enable it to maintain its form unbroken and so preserve its life. Furthermore, in the case of cutting and shearing, the severed edge of the work will tend to have a burred appearance unless specially designed tools are used. This point will be discussed later.

Effect of Incorrectly Designed Forming Tool

Figs. 3 to 8 show the reactions on the rubber when a wrongly designed forming tool is used. A lip about 3/16 inch wide is to be bent on a fairly heavy piece of sheet metal to form a flange. This bend may be considered one of the most difficult to obtain with rubber as the bending agent, excluding, of course, forms having curved contours.

In Fig. 3 the required form of flange is shown in dotted outline at y. The forming block illustrated is unsuitable for the job, as no consideration has been given to the mass of rubber which will come into action at the point x. This mass will descend in a bulbous form, as shown in Fig. 4, before any considerable pressure has been exerted. In this view are indicated the reactions after the initial pressure has been applied. The pressure exerted by the rubber has effect in all directions, as shown by the arrows. It will be observed that the force indicated by the arrow d is acting in opposition to the lip x.

In Fig. 5 the rubber has ceased to be a free agent and has become trapped. Before exerting sufficient pressure to effect any further deformation of the lip x, the rubber around the arrow d, Fig. 4, has taken the line of least resistance and traveled past the lip until it made contact with the forming block.

On the application of further pressure, an increase in the distortion of the lip x, as seen in Fig. 6, is to be expected, but at the same time the rubber which came into contact with the forming block has spread out and taken up a position under the lip. It is obvious that after this has occurred, no amount of pressure can have any effect on the lip, and, in consequence, the bend is only partially completed.

A further complication is introduced when pressure on the rubber is relieved. Owing to the fact that, when under pressure, the mass is greater in the region marked q in Fig. 7, the reaction of the rubber in that area will, on release of the pressure, be faster than that of the rubber mass about p.

This difference in reactions gives rise to a variation of flow, as shown by the arrows in Fig. 7, and explains the distorted shape of the work in Fig. 8. The variation in the immediate reaction of the rubber causes the rise at c. The faster flowing rubber, trapped beneath the lip b, has tended to lift the lip while the main body of the work was still held down (see Fig. 7). Furthermore, tears and cuts in the rubber will result from the same causes, as shown at h.

It is obvious that, for small flanges, recourse must be had to means whereby the cohesive properties are aided, if fully formed work is to be expected in one operation and the maximum service life obtained from the rubber.

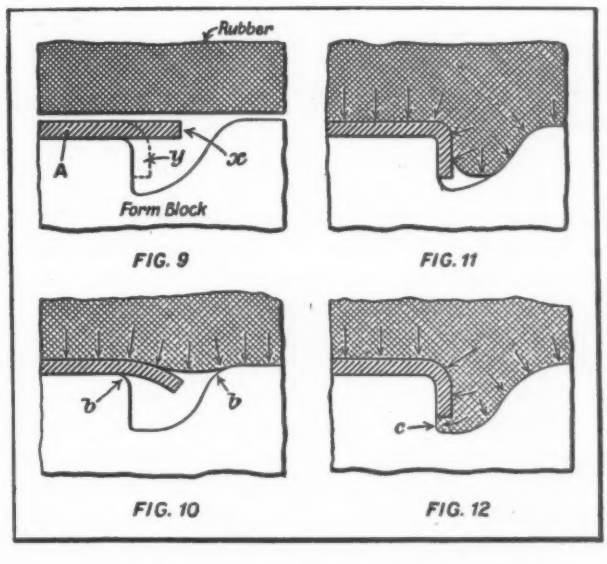


FIG. 9 FIG. 11

FIG. 10 FIG. 12

Figs. 9 to 12. Stages in the Bending of a Narrow Lip or Flange, Using Rubber with Suitably Designed Tools

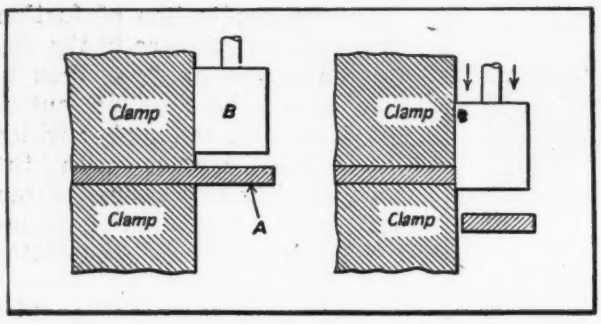


Fig. 13. A Simple Shearing Arrangement

Effect of Correctly Designed Forming Tool

In Figs. 9 to 12 are shown the reactions of the rubber and consequent effect on the metal when the tool is designed to overcome the difficulties described in connection with the previous example. Fig. 9 shows a piece of sheet metal *A* which is to be bent from the position *x* to that at *y*. The forming block has been made to conform more closely to the desired bend and a shoulder is provided to counteract the mass descent of rubber in the region where bending is to take place.

Pressure applied as shown by the arrows in Fig. 10 will cause a more or less even bulge between the points *b*. It will be observed that the sharp edge of the metal leaves the surface of the rubber. In Fig. 11 the rubber pad has, through continued pressure, bulged still further and the work is practically completed, although the edge of the metal is still clear of the rubber.

The pressure has been fully applied in Fig. 12. No cutting of the rubber occurs, due to the fact that in filling the gap *c*, the rubber has what may be described as a rolling motion about the edge of the metal.

Use of Rubber for Shearing Operations

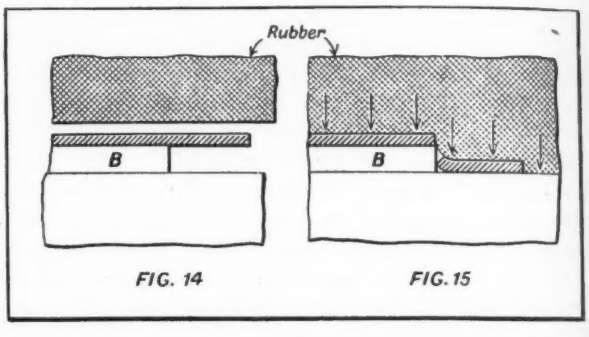
Bearing in mind the essential factor that brought about the application of rubber to press work, namely, the way in which rubber makes it possible to dispense with costly and accurate toolmaking and setting, it is advisable at this point to consider the important operation of punching and shearing.

While a considerable saving in toolmaking is thus achieved in connection with bending and similar operations, a still greater saving may be expected where cutting and stamping are to be performed, and more especially in the case of irregular contours. These operations, when carried out by the usual methods, call for tools of the highest precision, while great care is necessary and much time must consequently be spent on setting up and maintenance.

Where both cutting and forming are to be done in one operation, the precision factor in tool construction becomes even more important. Quite complicated and intricate structures are frequently involved, and in most cases considerable experimental and try-out work becomes necessary.

In Fig. 13 a common arrangement for shearing is shown. The work *A*, in this case a piece of sheet metal, is held firmly between two clamps, and a member *B* is forced down with a pressure sufficient to overcome the shear strength of *A*. For the sake of simplicity, no account has been taken of the bending action in this example, although, in practice, the deformation of the work is a most important factor in designing tools for use with rubber.

In general, the principle of bringing into action stresses to overcome the shear strength of the work can also be applied when using rubber. Assume an arrangement such as is shown in Fig. 14. A piece of sheet metal is laid on a sharp-edged tool *B*, which rests on the solid bed of the press. It is obvious that the result shown in Fig. 15 will be obtained if pressure of a magnitude greater than the shear strength of the plate is applied.



Figs. 14 and 15. A Simple Arrangement for Shearing with Rubber

No matter how spongy or soft the rubber may be, provided that it is trapped, pressure can be exerted until the rubber mass attains a density comparable with that of the work. This might be termed "live" density, inasmuch as the rubber, owing to its elastic properties, is constantly trying to revert to its original state. Therefore,

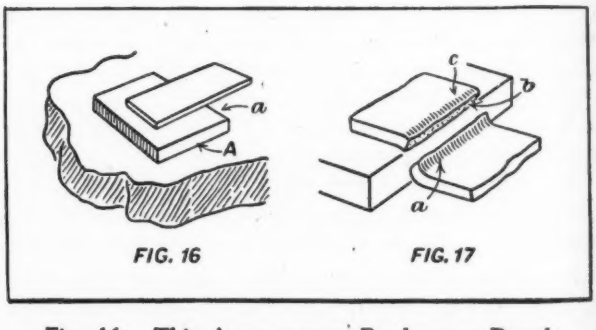


Fig. 16. This Arrangement Produces a Rough Edge and Deformation as Seen in Fig. 17

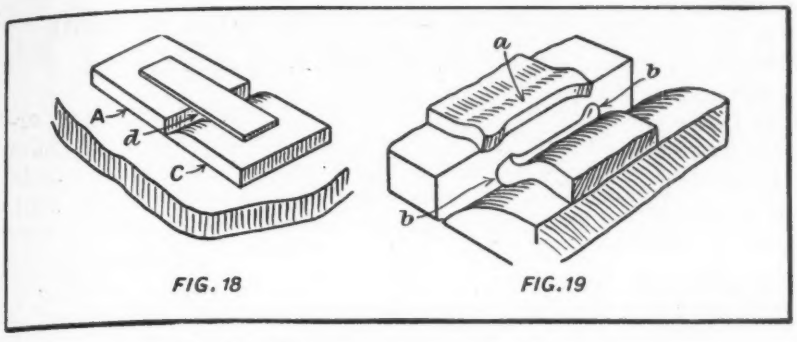


Fig. 18. This Arrangement Produces the Results Shown in Fig. 19

as soon as the pressure exerted exceeds the shear strength to be overcome, the elastic properties of the rubber are brought into play.

An advantage is that rubber readily adapts itself to any irregularities in the shape of the work and serves, at once, as a clamp and as an active agent. The rubber clamp, moreover, has less tendency to cause damage in the way of bruising or scoring than metal or wood.

In practice, however, the arrangement in Figs. 14 and 15 is not suitable for blanking when a well finished edge is desired. This was proved by the following test. A piece of sheet-metal strip was arranged as shown in Fig. 16, resting on a block *A*, the edge *a* of which was ground to a sharp square corner. The block was placed on the bed of the press and pressure applied. The result is shown in Fig. 17.

It will be seen that considerable distortion had taken place around the region of the edge *a* before collapse occurred, due to the fact that the strip tried to conform to the contour formed by the block and the press bed. When the breakage of the metal did occur, it was due to tension rather than shear, and, in consequence, the edge *b* was very rough. In addition, the upper surface *c* had a burred appearance, because the edge of the block had acted as a fulcrum when the pressure was first applied.

To correct these faults, the arrangement shown in Fig. 18 was tried out. The same block *A* was used, with an additional block *C*, which was chamfered at one edge. This block, together with the block *A*, was placed on the press bed with the chamfered edge adjacent to the cutting edge. The metal strip was then laid across the blocks, as shown, and pressure applied. The result is shown in Fig. 19.

Examination revealed that a much cleaner cut had been obtained at the center of the strip, but that the ridge previously observed in the region of *a* was still present, although much less marked. Another complication had been introduced, however, in the form of distortion and irregular breakage at the edges of the strip, as indicated at *b*. It was decided that this irregularity was due to the fact that the rubber had entered the gaps formed at the points *d* in Fig. 18, with a resultant action similar to that described in connection with Fig. 8.

Finally, a test was made on a piece of sheet-metal strip arranged as in Fig. 20. Blocks *A* and *B* were reduced in width to correspond with strip *E* and were placed on the bed of the press, together with two more blocks *C*, one on each side. These latter blocks act as barriers to prevent any rubber passing beneath the strip, as in the previous instance. In addition, a steel pressure pad *D* was placed on top of the strip to overcome the distortion

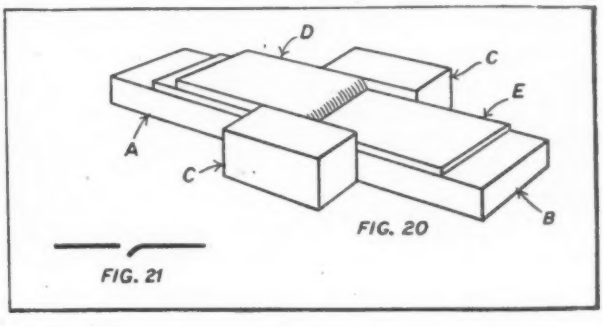


Fig. 20. This Arrangement Produces a Clean Sheared Edge as in Fig. 21

at *a*, Fig. 19. Pressure was then applied and a clean cut was obtained, as shown in Fig. 21.

The resultant flange on the material cut off is interesting, and, as will be explained in a later installment, advantage can be taken of it.

These experiments showed that, apart from a case where only a few pieces of a particular shape are required, it is not sufficient to use a cutting templet only, as the time wasted in

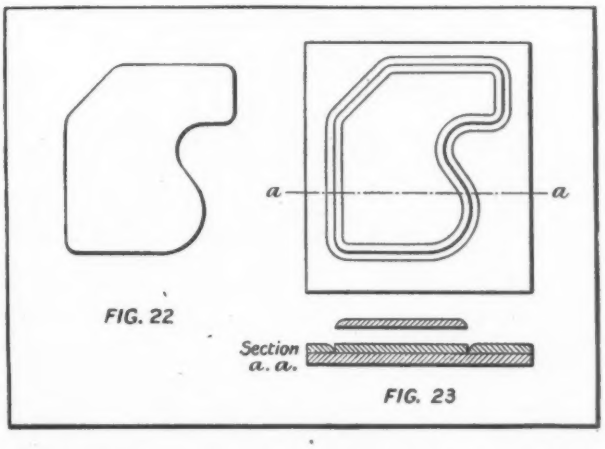


Fig. 22. Blank to be Produced. Fig. 23. Tool Required to Produce the Blank with Clean Edges

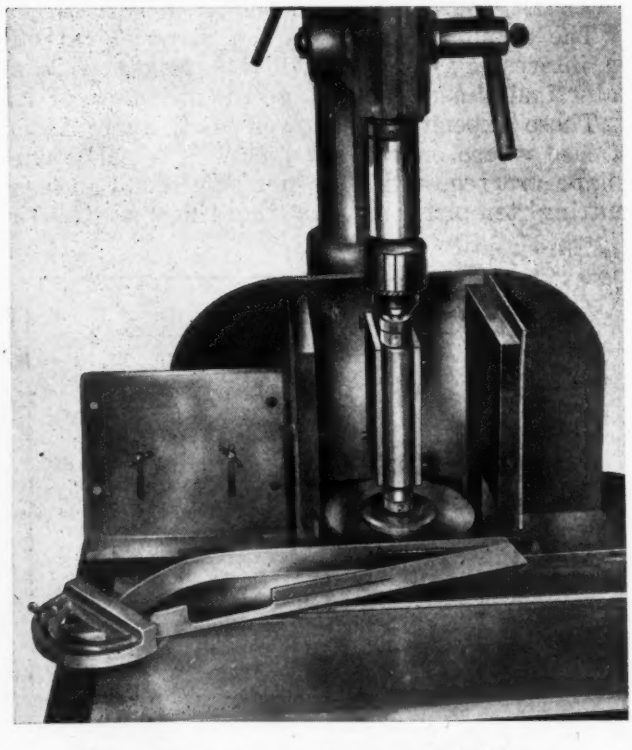
cleaning up ragged edges is considerable, and it is necessary to use an outer form as well. Consider the case where it is desired to cut twelve pieces of sheet metal to the shape shown in Fig. 22. It would be quite sufficient to make a sharp edged templet out of 10- or 12-gage steel and use it as a blanking tool. If, however, one thousand pieces were required, it would be preferable to use a tool of similar design to that shown in Fig. 23.

* * *

Drill Press Sawing Attachment for Trimming Flanges

A circular saw attachment used to trim flanges on formed parts in the Columbus, Ohio, plant of the Curtiss-Wright Corporation is shown in the illustration. This saw is equipped with an adjustable table for angle sawing, including means for adjusting for depth and height of cut. To the left is shown a guard which can be mounted directly in front of the saw. This guard is made of Masonite having an adjustable Plexiglas shield. In use, the shield is adjusted to fit in the channel of the part, in front of the saw, to protect the operator.

A movable bar is provided in the dovetail slot in the table, and there is a semicircular adjustable plate at one end of the bar to assist the operator in feeding the work to the saw. It requires only a few minutes to move this unit from one drill press to another.



Set-up for Trimming Flanges on Drill Press

Metal Congress and Exhibit to be Held in Cleveland

Some three hundred manufacturers and organizations serving the metal industries have made advance reservations for display space in the War Conference Displays in the Public Hall, Cleveland, Ohio, to be held in connection with the National Metal Congress sponsored by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. The Congress is scheduled for the week beginning October 16.

"These heavy advance reservations reflect the desire of the metal industry to come to grips with the problems that lie ahead," says W. H. Eisenman, managing director of the Congress, and national secretary of the American Society for Metals. The Congress and the displays are intended to emphasize the many developments that have been made during the great wartime activity, and to survey the present situation in the metal industries. The importance of the event is enhanced by the fact that many metal-working plants will convert at least part of their production to civilian goods soon.

The Metal Congress is sponsored by the American Society for Metals in cooperation with the American Welding Society, the Iron and Steel, and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, the American Industrial Radium and X-Ray Society, and the Society for Experimental Stress Analysis.

Technical sessions will be held each morning, afternoon, and evening during the Congress with nearly a thousand metal experts collaborating in the preparation and presentation of some 150 lectures. In addition to the technical reports on research developments of the past year, the American Society for Metals will present a series of practical panel type production meetings each afternoon and evening, with the exception of Thursday evening, when the annual dinner will be held.

* * *

Standard for Socket Set-Screws and Socket-Head Cap-Screws

The American Standards Association has recently approved a supplement to the American Standard for Socket Set-Screws and Socket-Head Cap-Screws identified as B18.3-1936. The supplement, which is designated B18.3a-1944, gives the dimensions of stripper bolts (hexagonal and fluted type socket-head shoulder screws) in eight nominal sizes, ranging from 1/4 inch to 1 1/4 inches. The new standard can be obtained for 10 cents by application to the American Standards Association, 29 W. 39th St., New York 18, N. Y.

Carbide-Tipped Hobs May Solve Marine Gear Bottleneck

RECENT tests on gear hobs made up with a steel body and replaceable cemented-carbide cutting teeth, sponsored by the Bureau of Ships, Navy Department, Washington, D. C., indicate a possible solution for one of the most serious bottlenecks in the production of marine steam-propulsion equipment—the hobbing of reduction gears. Operated on the climb-cut principle, one of these carbide-tipped hobs took roughing cuts at spindle speeds of 100 R.P.M., instead of at the customary speed of 35 R.P.M. employed with high-speed steel hobs. There were indications, however, that if the 72-inch hobbing machine used had been designed for faster operation, the hob would probably have performed even more satisfactorily at higher speeds, perhaps 150 R.P.M., which would have been equivalent to a peripheral speed of 225 feet per minute.

This composite hob is the result of a research initiated by the Navy Department in 1942 to determine the possibility of speeding up cutting of large marine gears. After the hob design had been approved, the Cleveland Hobbing Machine Co. supervised the making of two hobs 6 inches in diameter and having a 2 1/2-inch bore. Both hobs were of the five-pitch, single-thread type, but one was made in a left-hand style with Kennametal K4-H teeth, and the other in a right-hand style with teeth of 18-4-2 high-speed steel.

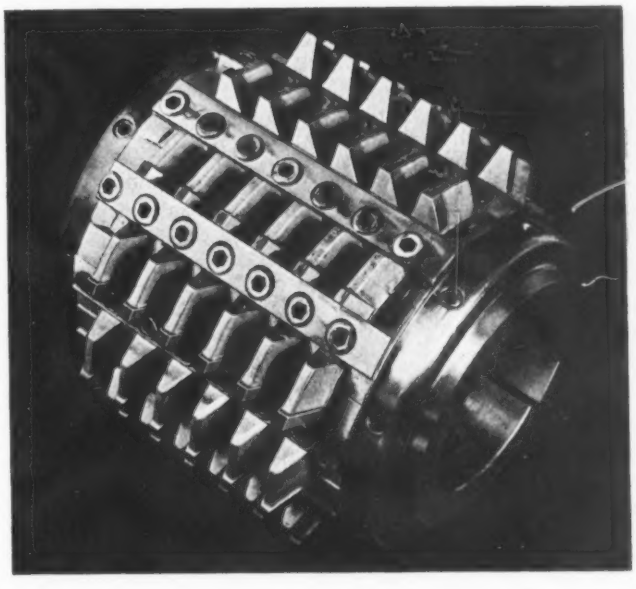


Fig. 2. Composite Hob with Tips of Cemented Carbide, which Performs the Operation Shown in Fig. 1 at Spindle Speeds of 100 R.P.M.

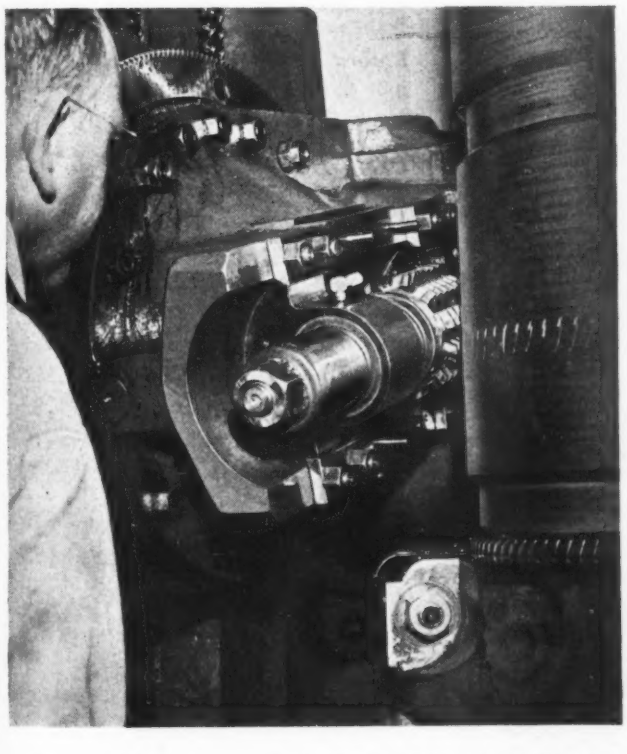


Fig. 1. Using a Composite Hob with Teeth of 18-4-2 High-speed Steel in Cutting Pinion Teeth for Marine-propulsion Reduction Gears

Gear cutting with these hobs was performed at the Joshua Hendy Iron Works, Inc., Sunnyvale, Calif., on a Gould & Eberhardt hobbing machine. First, the right-hand hob with 18-4-2 high-speed steel teeth was employed on a prepared blank of low-carbon steel, using the climb-cut principle, at a speed of 35 R.P.M. and a feed of 0.045 inch. Then the left-hand hob with carbide tips was used at speeds up to 100 R.P.M. and with a feed of 0.045 inch. Upon the completion of a C-3 pinion, the carbide-tipped hob was removed for examination and found to be in much better condition than standard hobs at the end of the same operation. The gear cut with the carbide-tipped hob had teeth of exceptionally fine finish and unusually accurate helix angles. Navy engineers attribute these qualities to the combination of the clean cutting action of the cemented-carbide tips with the climb-cut principle of hobbing.

Engineering News

Recently Built Presses of Giant Proportions

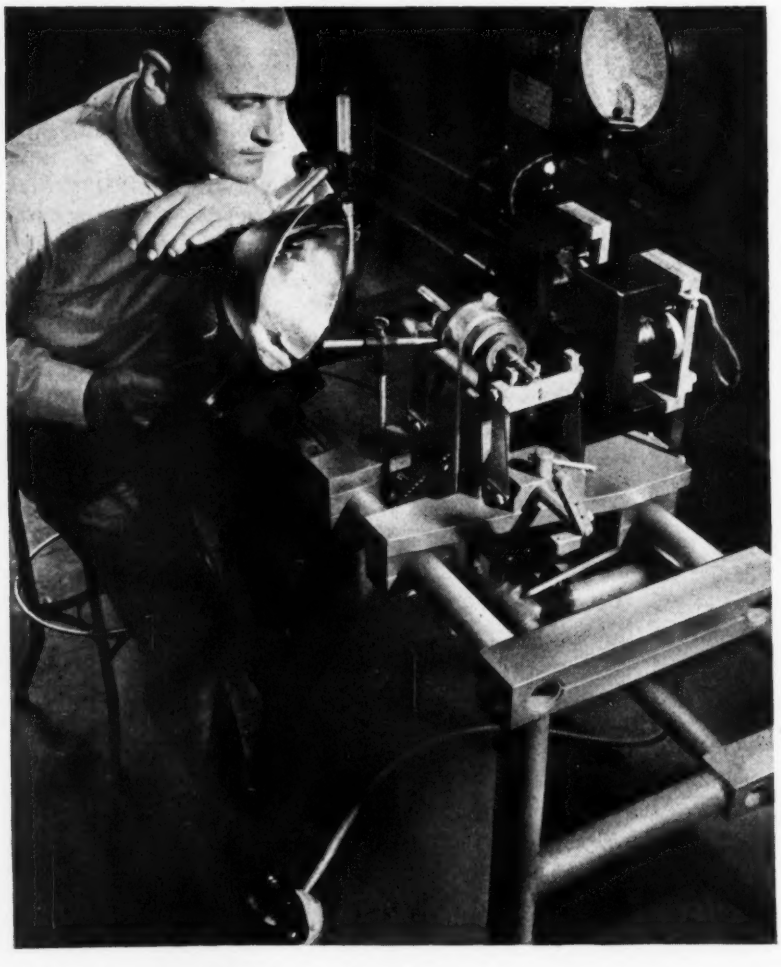
A short time ago, a huge 6000-ton press, designed for bending boiler plate up to 6 inches thick, was constructed by the Southwark Division of the Baldwin Locomotive Works. This press was said to be the largest one built up to that time. Now a still larger press has been built by the Southwark organization—a press capable of exerting a pressure of 8800 tons, which is intended for forming heavy plate.

It used to require thirty days to cold-roll and form a boiler shell for riveted construction. The 6000-ton press referred to reduced that time to four days by hot-forming. It is expected that the 8800-ton press will still further reduce the fabrication time. The new press has a capacity for bending boiler plate up to 6 inches thick, in lengths up to 42 feet. It is 60 feet wide and 60 feet high. Of this height, 26 feet is below the floor level.

Inspecting for Microscopic Flaws with Sodium Light

Sodium light, which has proved so effective in the prevention of night traffic accidents, is now being used in several important manufacturing plants for microscopic surface inspection, because of the facility with which pits, cracks, and flaws in the material can be detected under this light. The sodium lamp is essentially an arc lamp, and differs from the incandescent lamp in that it requires a special socket and individual control for each lamp.

According to H. A. Breeding, of the General Electric Illuminating Laboratory, the unusual perception of detail possible under sodium illumination is due to what is known as the monochromatic nature of the light. The eye, in common with other lenses, actually focuses only one narrow wave or color band at a time. Other colors in the beam tend to blur the picture. Thus, minute details may be lost in examining



Rotors for Electric Motors are being Balanced while Running at Normal Speed in This Electronic Dynetric Balancing Machine. By Means of a Stroboscope, the Operator Actually Sees the Spot on the Revolving Rotor that is out of Balance and Reads the Amount of Unbalance Directly on the Scale of the Meter. Dynetric Balancing, an Electronic Method Developed by Westinghouse Research Engineers, is Said to be the Most Accurate Method yet Devised to Indicate the Amount and the Location of Static and Dynamic Unbalance

an object under a light that contains all wave bands, in contrast to examining the same object under monochromatic light, which contains only one wave length.

As in the case of sodium lighting for night safety driving, monochromatic light for microscopic inspection is most effective when spread uniformly over a large area rather than concentrated in small bright patches. In this way, an undistorted view of both the size and shape of the flaws is obtained. For most effective results, the level of the illumination should be comparatively high, especially when the contrast between the flaw and the surrounding material is small.

It is helpful, in searching for cracks and blow-holes, to treat the part with either a light-absorbing or light-reflecting dye, the dye depending on the nature of the surface to be inspected. The dyed surface should be cleaned thoroughly before inspection. This procedure increases the contrast between the flaw and the object to the point where many times smaller flaws can be detected. In all cases, it has been found necessary to block out as much sunlight as possible, in order not to destroy the monochromatic nature of the sodium illumination.

New Alloy Replaces Silver in Searchlight Reflectors

According to *Metals and Alloys*, an alloy of cobalt, chromium, and tungsten has replaced silver for certain searchlight reflectors. This alloy, known as Stellite No. 6, has a reflectivity of 70 per cent as against 95 per cent for silver; but to offset its smaller degree of reflectivity, it is more highly resistant to corrosion from salt spray and air, and from powder and sulphur fumes. It also resists oxidation at high temperatures. In addition to Stellite No. 6, a nickel-base alloy, Hastelloy C, is used for smaller reflectors.

Magnetic Drain Plug that Removes Metallic Grit from Lubricants

Wherever moving parts operate in a bath of oil, as in gear-cases, transmissions, speed reducers, engines, and pumps, there is a likelihood of metallic particles becoming suspended in the lubricant. If the lubricant with these metallic particles is returned to the lubricating system, there is a possibility that excessive wear of gears, bearings, and other moving parts will result.

A magnetic drain plug has been brought out by the Lisle Corporation, Clarinda, Iowa, which is provided with powerful permanent magnets to attract and hold metal cuttings and particles in the lubricant. By removing these particles as fast as they are gathered on the drain plugs, the life of the equipment lubricated is greatly prolonged. No change in design of the housings or oil reservoirs is required, since these plugs are interchangeable with the ordinary drain plugs.

World's Deepest Hole—An Oil Well—Extends Down Over 15,000 Feet

To the machine shop man, deep-hole drilling is one thing, but to the oil-well engineer it is another. The deepest hole ever drilled for oil-well purposes is located in Pecos County, Tex., twenty-seven miles southeast of Fort Stockton. This oil well is 15,279 feet deep, with a diameter of 20 inches at the top, tapering to a diameter of 7 3/4 inches at the bottom. It took approximately two years to drill this hole. In all, 467 drill bits were used in this work.

Immediately after the drilling was completed, more than 600 units of casing, 5 1/2 inches outside diameter, were coupled together by threaded joints and lowered into the well. The weight of the entire casing is 156 tons. After the casing was lowered, 1000 sacks of cement were pumped in between the wall of the hole and the outside of the casing to hold it firmly in position. The cement used was of a high-temperature resisting type, because the temperature at the bottom of the 15,000-foot hole is from 235 to 240 degrees F.

World's Purest Iron a Yardstick for War Metals

In Pittsburgh, where the output of steel is measured in millions of tons annually, there is also produced an ultra-pure iron at the rate of 1000 pounds a year. This iron is made in furnaces at the East Pittsburgh Works of the Westinghouse Electric & Mfg. Co. It is used in checking the metals that go into guns, planes, tanks, and ships.

This pure iron contains only one ounce of impurities in the 1000 pounds produced each year. It is formed into rods about the size of a lead pencil. In the laboratories of steel mills and war plants, these rods are put in a spectrograph, where the iron is heated with an electric arc. The light rays radiating from the iron produce a spectrum which is recorded on a photographic film. By comparing the spectrograph pictures of pure iron with similar spectrographs of the metals being tested, investigators can determine the composition of the latter quickly and accurately.

Editorial Comment

Unless, as soon as the war emergency measures become unnecessary, we return to the freedom of industrial enterprise and encourage individual initiative, this nation, instead of going ahead as it can and should, will economically slide backward. If the past ten years have proved anything, they have proved that Government is incapable of managing industrial enterprises. In many instances, Government has made most serious mistakes in its efforts to assume the duties of business and industrial management. Had it not been that back of the Government there were unlimited economic resources, based on its taxing and borrowing power, many of the things that have turned out successfully because of the ability to spend lavishly, would have proved failures as examples of industrial management.

Time for Industrial Enterprise to Again Have a Chance

Of what value is all our mechanical progress —our inventions and our scientific research—if industry, enterprise, and initiative are to be so hampered by Government restrictions that this progress cannot be utilized in creating new industries, more employment, and a steadily improving mode of living for the American people?

Have we for the past decade been engaged in an experiment that has proved unsuccessful? If so, is it not time to stop experimenting and begin to apply common sense—that good old common sense that gradually, during the past, made this country the leading industrial nation of the world, with higher wages and better living conditions than anywhere else? Industrial enterprise and individual initiative made this possible. Is it not time that industrial enterprise again be given a chance?

★ ★

A management engineer who has had a great deal to do with increasing production in industrial plants says that, in nearly every case where a properly devised and fairly administered wage incentive plan has been used, substantial increases in production have followed, and surprising results have been obtained in raising both the productivity and the income of industrial workers. In fact, he says that in the majority of the cases with which he has had experience, production has been increased 25 per cent, and even more, above that considered normal previous to the installation of the wage incentive plan.

Obviously, when production is increased, the overhead charge against each unit produced is correspondingly decreased, so that the greater efficiency and bigger pay of the worker are accompanied by greater returns on the investment and the possibility of giving greater value to the customer.

When both management and labor understand that greater earnings for the worker due to his increased productivity are mutually advantageous, a great step forward will have been taken in the matter of industrial relations. If management aims at profits rather than production, it is on the wrong track and will ultimately succumb to more efficient competition. If labor aims at higher wages for no more work or for less work, it is equally shortsighted, because in the long run, no benefits are derived, since the only way by which we can then compensate for the higher wages is by higher prices.

Increased Production the Only Permanent Road to Higher Wages

"When both groups realize," says this engineer, "that such reasoning defeats its own ends and that each group will serve its interests best by getting together with the other group to create larger earnings for labor, greater production, larger profits, and lower prices, then the most serious differences between management and workers will have been overcome.

"Unless there is real cooperation between management and labor, and unless Government does its best to create conditions favorable to industrial progress, all other post-war planning will be of little importance."

★ ★

Our investment in manufacturing plant and equipment a hundred years ago amounted to only a few hundred dollars per worker. Today, before a worker can be employed, somebody has to invest approximately $8000 in machinery, buildings, and other facilities.

Ingenious Mechanical Movements

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and Other Devices

Intermittent Worm-Drive Mechanism

By L. KASPER

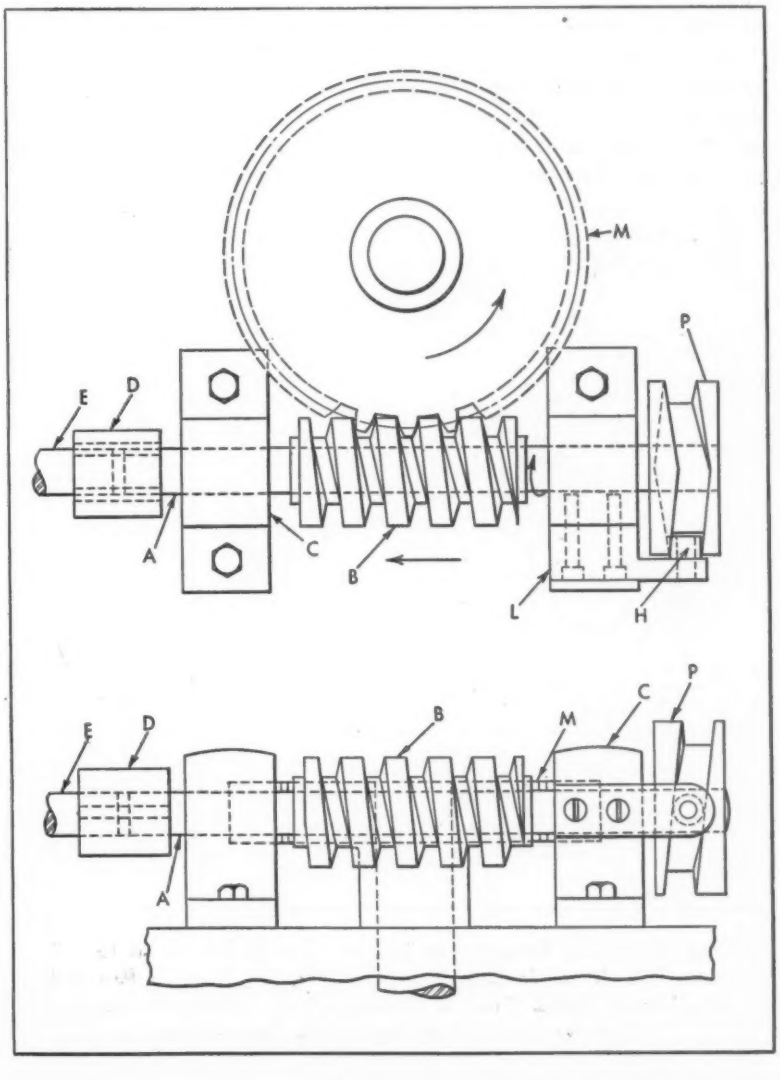
A worm drive of rather unique design developed for use on a wire-forming machine is shown in the accompanying illustration. The mechanism comprising this drive converts a continuous rotary motion into an intermittent rotary motion at a reduced rotative speed. The object of employing the worm and worm-wheel is to give a compact high-ratio speed reduction in combination with the intermittent motion.

Referring to the illustration, shaft *A*, mounted in bearing *C*, carries the single-thread worm *B* and rotates in the direction indicated by the arrow. Shaft *A* receives its motion from the driving shaft *E* through the splined sleeve *D*, which permits axial movement of shaft *A*. Worm *B* meshes with the worm-gear *M*, to which it transmits motion in the direction indicated. Shaft *A* carries cam *P*, which rotates with it. Bracket *L*, attached to bearing *C*, carries roller *H*, which operates in the groove of cam *P*. It is obvious that, owing to the fixed position of roller *H*, the rotation of cam *P* will cause shaft *A* to be moved axially.

The groove in cam *P* is shaped to produce a uniform axial motion in one direction during one half revolution, and in the reverse direction during the other half revolution. The lead of cam *P* is equal to the lead of worm *B*.

If worm *B* were fixed against axial movement, one revolution of worm *B* would produce a movement of gear *M* equivalent to the lead of the worm. However, in addition to rotative motion, worm *B* is also given an axial motion by cam *P* acting against roller *H*, as mentioned; thus the rotation of gear *M* is effected by both the rotative and axial movements of worm *B*. As the lead of worm *B* and cam *P* are equal, the motion of gear *M* equals that which would be produced by an axially fixed worm of double the lead of worm *B*.

As shaft *A* continues to rotate, roller *H* is passed by the high point of cam *P*, which reverses the axial movement of shaft *A*. When this occurs, there is no movement of gear *M*, as the axial movement of shaft *A* produced by cam *P*



Worm and Worm-wheel Drive with Cam-actuated Worm that Provides Intermittent Rotary Movement

is equal to the lead of worm *B*, but is in the reverse direction. In this manner, the axial movement of shaft *A* neutralizes the lead of worm *B*, the worm merely turning or threading itself back to its original position without imparting any motion to gear *M*. The effect is to produce a series of partial revolutions of gear *M* with equal rest periods between the movements.

Cam Mechanism with Variable Quick-Drop Adjustment

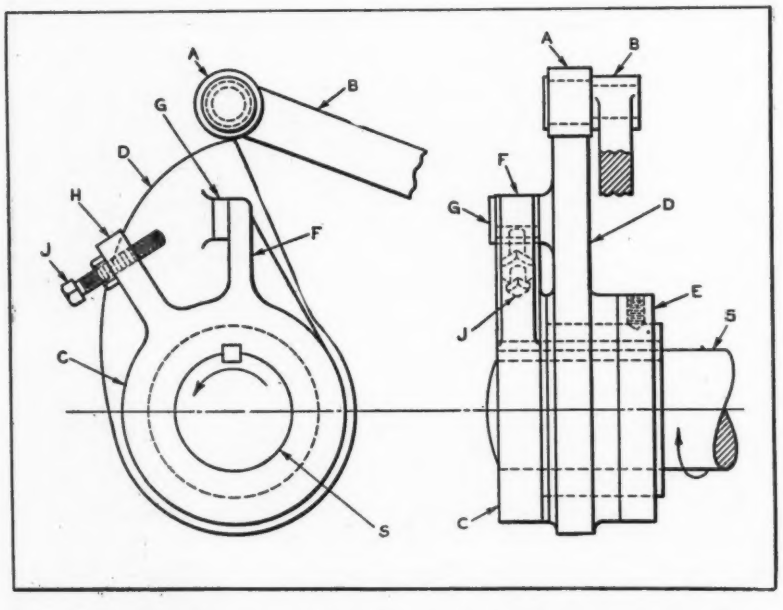
The cam mechanism illustrated was designed to raise follower-roll *A* at the end of lever *B* at a uniform rate until the highest point of its travel is reached, and then to permit it to drop quickly a predetermined adjustable distance before resuming its downward movement at a slower rate. This adjustable quick-drop cam mechanism is used on a wire-fabricating machine to transmit the particular motion required on one of the machine parts through lever *B*.

Driving shaft *S* revolves in a horizontal position in the direction indicated by the arrow, and carries with it flange *C*, to which it is keyed. Cam *D* is a free running fit on the hub of flange *C*, on which it is retained by collar *E*. With the members of the mechanism in the position shown, shaft *S* transmits motion to cam *D* through contact of arm *F* with the projection *G* on cam *D*. The arm *F* forms an integral part of flange *C*.

The profile of cam *D* is designed to transmit a slow uniform upward vertical movement to roll *A*, followed by a rapid drop. Arm *H*, which is a part of flange *C*, carries stop-screw *J*. Roll *A* is kept in contact with cam *D* by a spring (not shown), which is attached to lever *B*.

As shown in the illustration, roll *A* is nearly at the top of its vertical movement. As soon as the peak of cam *D* passes under the center of roll *A*, the downward pressure of the spring attached to lever *B* reacts on the angular face of cam *D*, causing its rotation to be rapidly accelerated in the direction in which it is turning until projection *G* comes in contact with stop-screw *J*. Since this movement takes place rapidly, as controlled by the tension of the spring, there is a rapid drop of roll *A*, which is limited by the contact of projection *G* with adjusting stop-screw *J*.

Continued rotation of shaft *S* permits cam *D* to rotate at a slow rate of speed, the drop of roll *A* at this point being at the same rate as though cam *D* were keyed directly to shaft *S*. As the heavier side of cam *D* reaches a position opposite that shown in the illustration, it remains at rest until arm *F* again comes in contact with projection *G*. K. L.



Cam Mechanism Designed to Impart Upward Movement to Follower Roll A at Uniform Rate until Highest Point is Reached, then Permit Quick Drop a Predetermined Adjustable Distance, Followed by a Slow Descent to Lowest Point

* * *

New Industrial Motion Pictures

A two-part, all-color, sound movie, entitled "The Story of Alternating-Current Welding," has been developed by the General Electric Co., Schenectady, N. Y. This is a 16-millimeter film which is available to all General Electric arc-welding specialists and distributors who will exhibit it, on request, to industrial audiences. The film requires approximately thirty-five minutes to show. It tells in detail the complete story of alternating-current arc welding and its advantages, and should be of interest to all who are facing new production problems in the post-war era.

Another film, entitled "Only a Gasket," has been produced by the Goetze Gasket & Packing Co., Inc., 17 Allen Ave., New Brunswick, N. J. This color and sound film, requiring thirty-five minutes to show, is available to employe groups, technical societies, engineering schools, and similar organizations. The commentary accompanying this film is by Lowell Thomas.

The film emphasizes the importance of sealing the joints in equipment subjected to high temperatures, pressures, corrosion, and similar conditions.

Disposal of Government Surplus Machine Tools

A PRICE policy for the disposal of Government-owned surplus used machine tools was announced some weeks ago by William L. Clayton, Surplus War Property Administrator. The object is to establish a pricing policy that will put surplus machines back into production as quickly as possible, thus creating post-war jobs, stimulating enterprise, and at the same time, recovering for the Government as much of the original investment as possible.

It is believed by the Administrator that the policy adopted will facilitate prompt and orderly disposal of machine tools, avoiding expenses and losses due to depreciation, obsolescence, warehousing, and handling costs that would result from delayed disposal.

The price formula adopted is for standard general-purpose machine tools. A price policy for special types of machine tools will also be formulated. The schedule now promulgated considers two groups: (1) When the tools are not in the purchaser's plant they are sold with an immediate depreciation of 15 per cent, less 2 1/2 per cent per month for the first six months, 1 per cent per month for the next four months, and 0.8 per cent per month for the next twenty-six months. The results of this pricing policy are given in Column A of the accompanying table. (2) When the tools are sold to a purchaser or lessee who has the tools in his own plant, the price is 5 per cent higher than in the first group. The figures applying in this case are given in Column B of the table. The higher percentage allowed when the purchaser has the tools in his own plant is due to the fact that not only has he definite knowledge of their condition, but he does not have to pay freight charges.

The depreciation price is based on the machine tool manufacturer's original price, inclusive of electric equipment and standard accessories, f.o.b. the machine tool builder's plant. The price to the buyer of the used machine is f.o.b. cars or trucks at the location of the machine when sold. Any available tooling can be purchased at the customer's option according to the same pricing formula.

The depreciation price period is determined from the date the machine was originally put to use (actual or estimated) to the date of termination of the contract for the lessee's facilities, or to the time that the machine was withdrawn from Government contract work, placed in storage, or sold (whichever is earlier).

* * *

Hardenability Specifications for Commonly Used Steels

A tentative uniform method of specifying alloy steels by hardenability, to facilitate the selection and processing of steels on the basis of physical characteristics rather than chemical composition, has been developed jointly by the Society of Automotive Engineers and the American Iron and Steel Institute. This uniform method at present applies to thirty-seven fine-grain steels. Information pertaining to the subject is given in a booklet entitled "Tentative Hardenability Bands," which is available from the Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. The specifying of steels by hardenability tests was described in July MACHINERY, page 206.

Table for Determining Price of Government Used Surplus Machine Tools

Depreciation Price Period, Months	A Per Cent	B Per Cent	Depreciation Price Period, Months	A Per Cent	B Per Cent
Less than 1 month	85.0	90.0	19	58.8	63.8
1	82.5	87.5	20	58.0	63.0
2	80.0	85.0	21	57.2	62.2
3	77.5	82.5	22	56.4	61.4
4	75.0	80.0	23	55.6	60.6
5	72.5	77.5	24	54.8	59.8
6	70.0	75.0	25	54.0	59.0
7	69.0	74.0	26	53.2	58.2
8	68.0	73.0	27	52.4	57.4
9	67.0	72.0	28	51.6	56.6
10	66.0	71.0	29	50.8	55.8
11	65.2	70.2	30	50.0	55.0
12	64.4	69.4	31	49.2	54.2
13	63.6	68.6	32	48.4	53.4
14	62.8	67.8	33	47.6	52.6
15	62.0	67.0	34	46.8	51.8
16	61.2	66.2	35	46.0	51.0
17	60.4	65.4	36 (or more)	45.2	50.2
18	59.6	64.6			

Profile Milling Saves Forging Die Cost

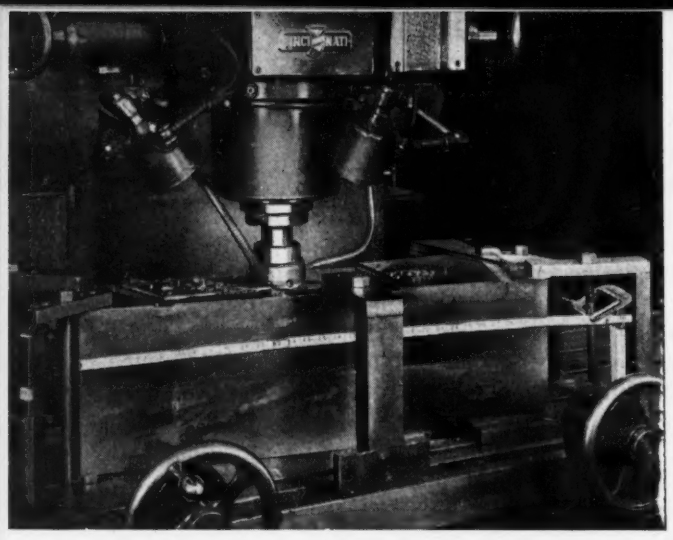
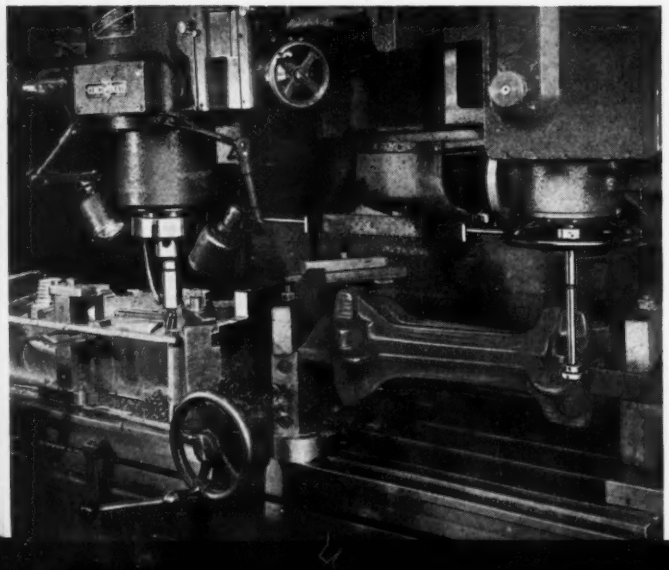


Fig. 1. Milling a Trial Aircraft Wing Hinge from a 1400-pound Steel Billet on a Hydro-Tel Milling Machine

SOME time ago the machine shop in the Columbus, Ohio, plant of the Curtiss-Wright Corporation, builder of Curtiss Helldiver dive bombers, was faced with the problem of providing several aircraft wing hinges of a new design for experimental testing. Forging dies for the job would have cost from $75,000 upward, and these dies would, of course, be worthless if the new design of hinge did not stand up under test. It was felt worth while, therefore, to go to unusual lengths to produce the needed trial pieces entirely by machining.

After considering various ways in which this might be accomplished, it was finally decided to cut the wing hinges directly from the solid on a Cincinnati vertical Hydro-Tel milling machine equipped with an automatic tracer mechanism, using a wooden pattern as a guide for the follower. Each sample wing hinge was cut out of a 1400-pound chromium-molybdenum steel billet similar to that shown in Fig. 1. Each billet was, roughly, 30 inches long, 16 inches wide, and 10 inches high, and was in a normalized condition, with a tensile strength of about 90,000 pounds per square inch.

The roughing out operation is shown at an early stage in Fig. 2, where a 5-inch



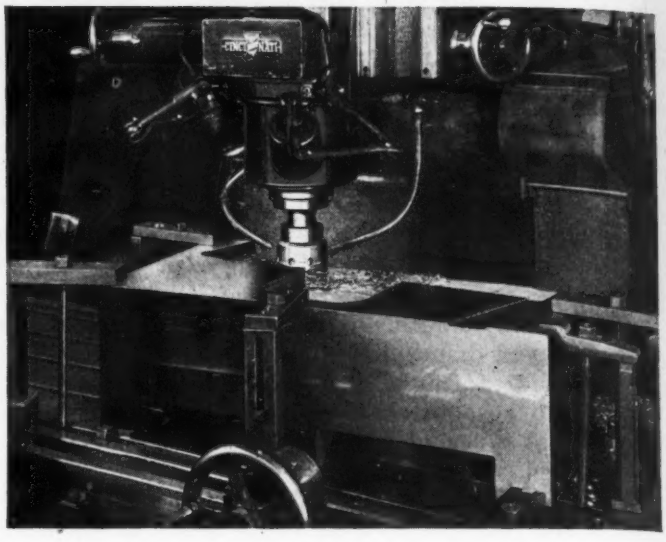


Fig. 2. Roughing out Aircraft Wing Hinge with a 5-inch Diameter Inserted-tooth End-mill

Fig. 3. View Showing Uncut Portions that are to be Shaped to Form High Points on One Side of Wing Hinge

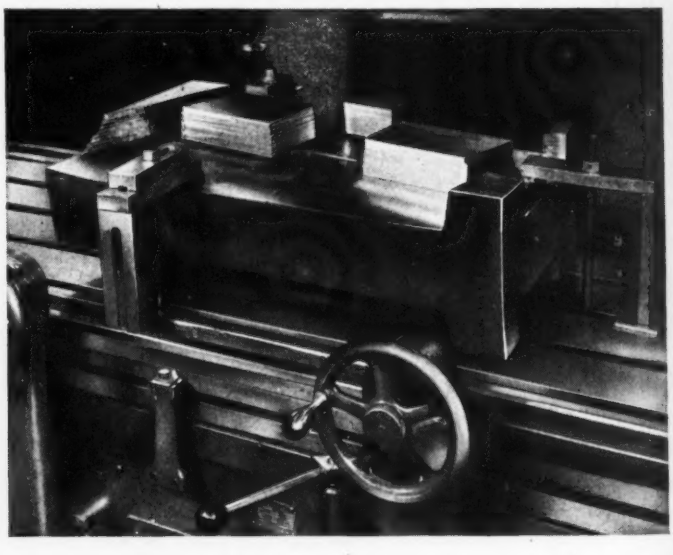


Fig. 4. (Left) View Showing, at Right, the Wooden Pattern Used as a Guide in the Profile Milling Operation

By ALEX MAXROCZY

Superintendent of Fabricating Departments
Columbus, Ohio, Plant, Curtiss-Wright Corporation

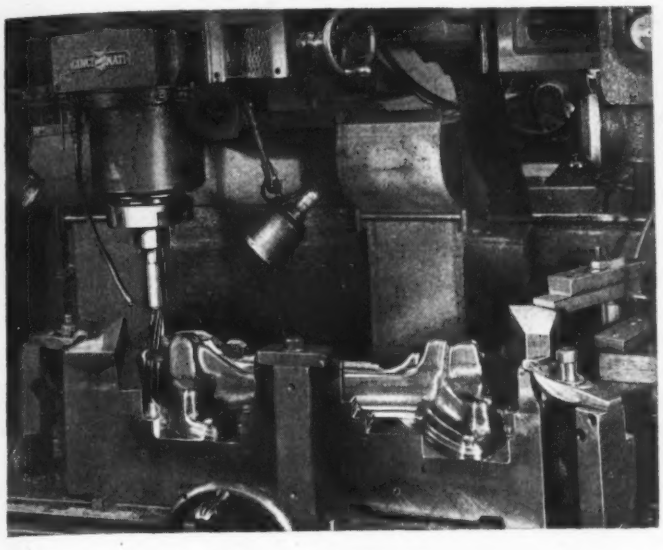


Fig. 6. Finish-milling the Half of the Wing Hinge Shown being Roughed out in Fig. 5

Fig. 7. Finish-milling Reverse Side of Wing Hinge, which Completes the Milling Operations on the Part

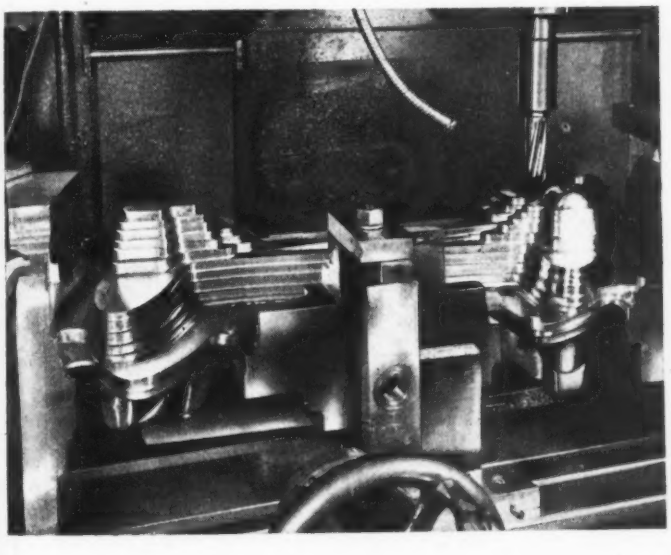


Fig. 8. (Right) Finished Wing Hinge, which Weighs Only 64 Pounds, is Shown in the Foreground

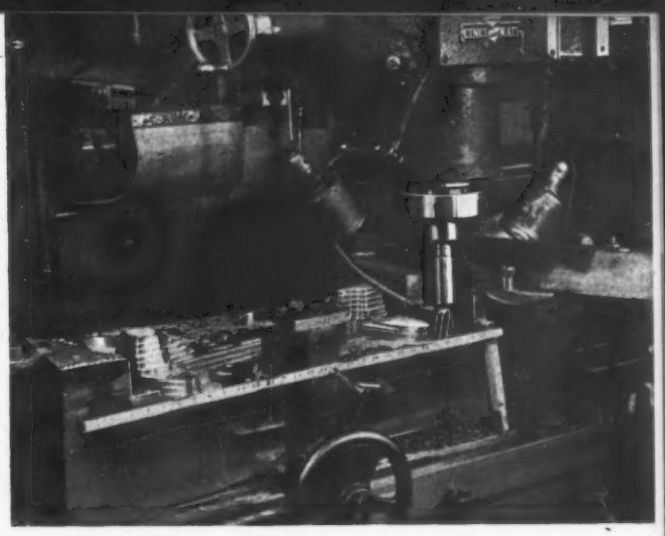


Fig. 5. At This Point in the Profile Milling Operation, About Half the Wing Hinge has been Roughed out

diameter inserted-tooth end-mill is seen being used. Fig. 3 shows two sections that have been left uncut and that later will be shaped to form high points on one side of the wing hinge. The ridges around these sections show the depth of each horizontal cut. Clearly evident, too, is the large amount of stock that must be removed. The finished wing hinge weighs only 64 pounds, as compared with the original billet weight of 1400 pounds. The wooden pattern used as a guide for the follower is shown at the right of Fig. 4.

In Fig. 5, the milling operation has progressed to the point where one half of the wing hinge has been roughed out, and in Fig. 6 this half is being finish-milled to smooth contours. Fig. 7 shows the workpiece inverted, and the opposite half, which is an exact duplicate, nearing completion.

The finished wing hinge is shown in Fig. 8. Directly back of it is the wooden pattern, and in the left background another wing hinge is being milled from the solid. The first trial hinge made by this method took about 300 man-hours. The sixth, and last, piece required about half that time. Considerable savings were thus made over the cost of experimental forging dies.

Methods of Using Dowel-Pins in Precision Tool Design

By EUGENE E. JAMES, Manufacturing Research Lockheed Aircraft Corporation, Burbank, Calif., and Tool Engineering Instructor, University of California

IN diemaking, where tolerances often split thousandths of an inch, it is important that correct doweling methods be used. Dowel-pins should be employed for locating purposes only and never to replace a screw for fastening purposes. The reason for this is made clear by reference to Fig. 1. The clearance around the head and body of the cap-screw shown in this view permits lateral movement when a thrust exerted in the crosswise direction is of sufficient force to overcome the frictional resistance to motion. In order to prevent any such movement of parts, dowel-pins are generally employed in the assembly.

Dowel-pins are generally purchased from diemakers' accessory supply houses. Sometimes, however, dowel-pins of special lengths or diameters are required and must be made to order in the tool-room. Dowel-pins are generally machined from S A E 1095 steel, heat-treated to Rockwell 60-65 hardness on the "C" scale, and then centerless ground 0.0002 inch over the

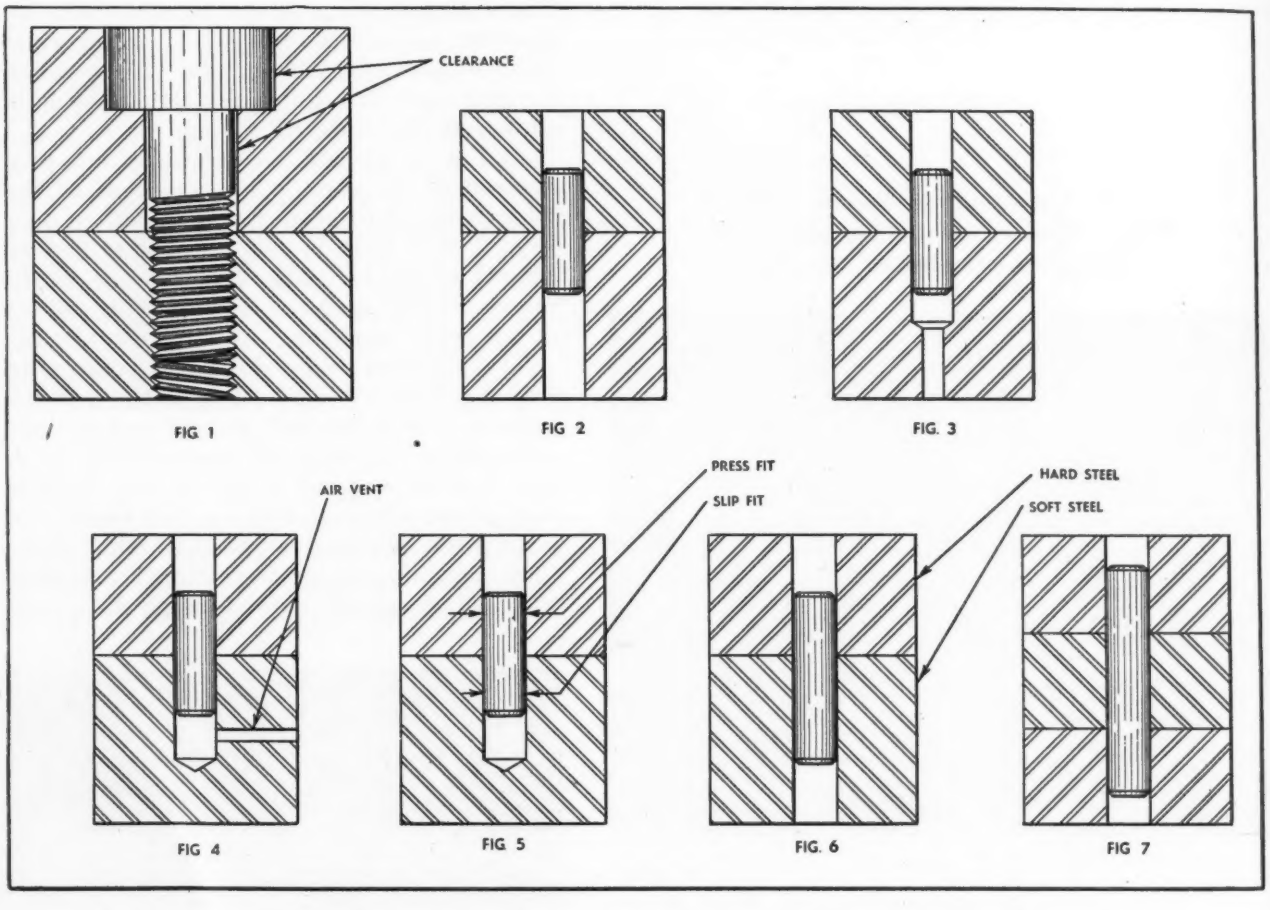


Fig. 1. Cross-section of Pieces Fastened together by Cap-screw, Showing Necessary Clearance around Head and Body of Cap-screw. Fig. 2. "Through" Type Dowel-pin. Figs. 3 and 4. Semi-blind Dowel-pins. Fig. 5. Application of Blind Dowel-pin. Fig. 6. Dowel-pin Used to Locate Hardened Part on Soft Steel Part. Fig. 7. Three Parts Located by One Dowel-pin

nominal diameter in accordance with the commercial standard practice. The 0.0002 inch over the nominal diameter allows for the proper press fit between the mating parts when a standard nominal size reamer is used to finish the hole.

A wide range of diameters and lengths of dowel-pins 0.001 inch over size are also carried commercially in stock along with the standard dowel-pins. These over-size pins are generally used for repair work or when a hole has been machined over size.

Tool-Room Doweling Practice

The length of a dowel-pin is usually determined by multiplying its diameter by 3; in other words, a length equal to one and one-half times its diameter will be a press fit in each of the mating parts. However, this rule is modified somewhat for the smaller diameter pins, the general practice being to select a dowel-pin slightly longer than three times the diameter, as short dowel-pins are hard to start and the toolmaker may not always drive the dowel-pins to the exact position shown on the tool drawing. An experienced toolmaker can usually tell from the hammer blows required to drive the dowel-pin into place whether there is a proper press fit between the mating parts. This provides an important check on both the size of the reamed dowel-pin hole and the diameter of the dowel-pin.

When doweling heat-treated steel parts, it is important that the dowel-pin holes be lapped to free them of any decarburization which may have occurred during the heat-treating process.

Designation of Dowel-Pins

When purchasing dowel-pins they are ordered as either "standard" or "over-size" pins; however, once these pins are used on a specific job, they are referred to in accordance with their application. Thus, they acquire new names, being called "through," "semi-blind," or "blind" dowel-pins. The toolmaker prefers to use the "through" type of dowel-pin, as this is the only application in which the work is drilled and reamed entirely through the parts to be doweled. This type (shown in Figs. 2, 6, and 7) can be pressed in or driven out from either end.

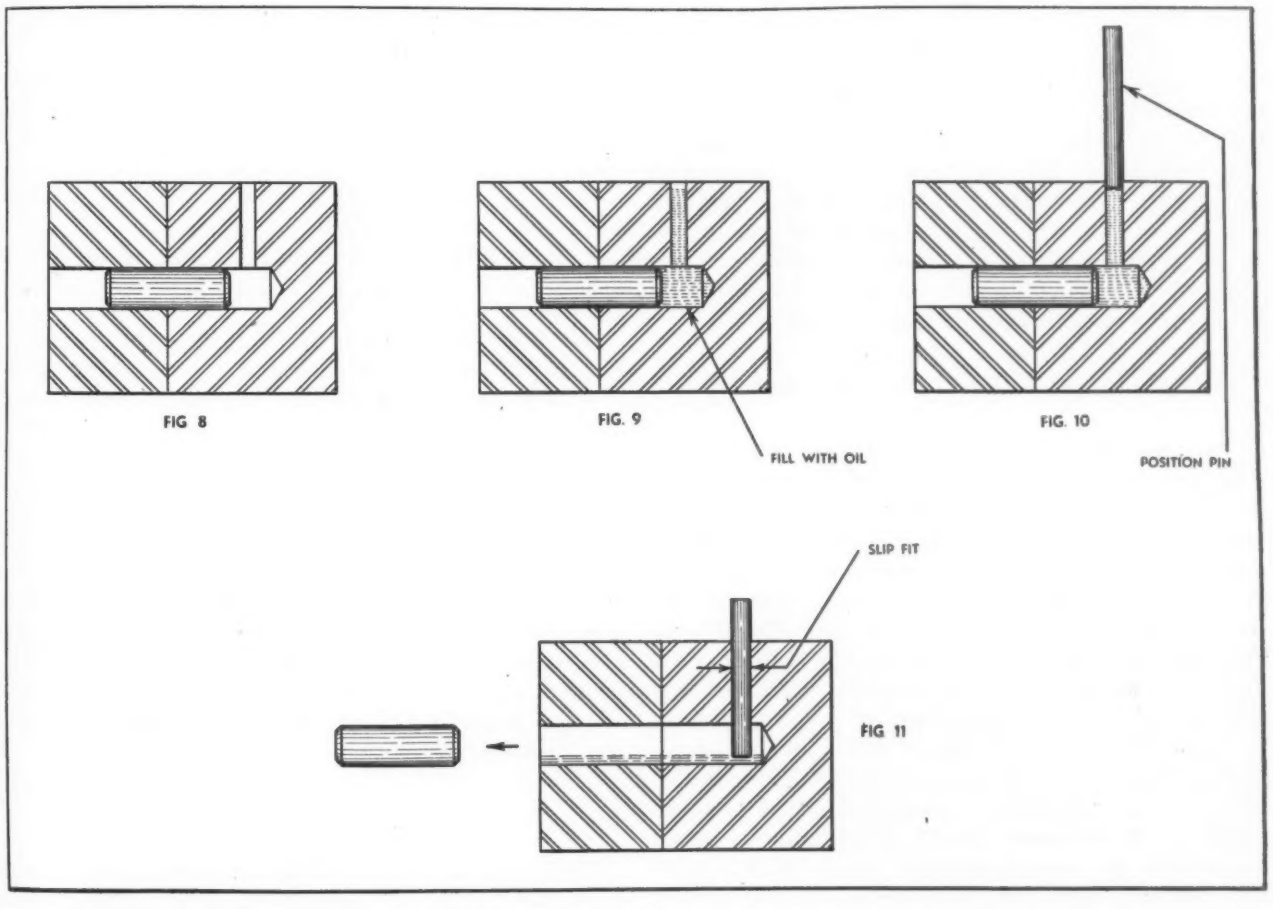


Fig. 8. Parts with Semi-blind Hole Positioned for Removing Pin. Fig. 9. Cavity in Back of Dowel-pin Filled with Oil. Fig. 10. Rod in Position for Compressing Oil to Remove Dowel-pin from Hole. Fig. 11. Dowel-pin Removed from Semi-blind Hole by Hydraulic Pressure

Applications of Semi-Blind and Blind Dowel-Pins

The semi-blind type dowel-pin is used when it is objectionable to ream the same size hole all the way through the work, but is not objectionable to have a smaller hole drilled as shown in either Fig. 3 or 4. The smaller hole shown in Fig. 3 serves as an air vent and also as an opening for inserting a rod for driving out the dowel-pin. This hole should be at least one-half the size of the reamed hole, and preferably one-half the size plus 1/64 inch to permit easy removal with a steel rod of standard diameter. When this smaller hole is objectionable, it should be determined whether the tool design will permit having the air vent hole at an angle of 90 degrees to the longitudinal axis of the dowel-pin, as shown in Fig. 4. By using the latter type of construction, the dowel-pin can be removed by placing the mating parts so that the air vent hole is in a vertical position, as indicated in Figs. 8, 9, 10, and 11, and pouring oil into the air vent until it is full, inserting a rod in the hole and tapping it with a hammer. The hydraulic pressure created by the hammer blows will generally remove the pin.

Blind dowel-pins (Fig. 5) are always required to be a slip fit in the blind hole and a press fit in the mating part. This type should never be used when it is possible to use either the through or semi-blind type. The precision of the tool and the number of grinds required, as well as the length of die life, are affected by slip-fit doweling. It should be remembered in designing a tool that the removal of blind dowel-pins may become a costly tool-room problem; therefore, every effort should be made to eliminate the blind type dowel-pin construction.

Number of Dowel-Pins Required

In good die designing, conditions will generally be such that the number of dowel-pins can be kept to a minimum. For example, huge side thrusts can and should be compensated for by designing the punches with heels where possible. A properly designed heel not only relieves the lateral loads on the punch and die, but it also relieves the burden placed on the leader pins and the punch press. A method that pertains particularly to the designing of cutting dies is to make the die-block out of one piece of steel, rather than of two or more sections. This single-piece design provides a construction of greater rigidity. It has been found practicable to make die-blocks of comparatively large face areas and reduced sectional thicknesses by the use of flame hardening.

In locating work, two dowel-pins will actually locate the work as well as three or four dowel-pins. However, the number of dowel-pins required may be more than two, depending upon the total lateral load; the load on each pin must not exceed the shear strength of the pin or deflect it to the extent that tolerances are affected. The same principle applies to the bearing strength of the mating parts, should their strength be less than that of the dowel-pins. The following general rules should prove helpful in determining the diameter and number of dowel-pins required:

1. If the mating metals have a low bearing strength and the loads are high, use hardened steel bushings that are a press fit in both the mating parts.
2. If one of the mating metals is hardened steel and the other metal has a low bearing strength and the loads are high, use press fit hardened steel bushings in the metal that is soft; this will increase the strength of the assembly by raising the bearing strength of the weakest member.
3. In cases of narrow sections or heavy plates, it may be necessary to use three or more dowel-pins to reduce deflection and distribute the stresses more evenly. However, regardless of the number of dowel-pins used in the tool design, select a dowel-pin that is at least equivalent in diameter to the diameter of the screws used in fastening.

Dowel-pins can be used effectively for locating more than two parts in an assembly, as shown in Fig. 7.

* * *

Reducing Shut-Down Time When Motors Overheat

Overheated motors on tapping and drilling machines can be placed back in operation in a few minutes by a method recently developed, instead of waiting an hour or so before the motor cools down. According to F. J. Johns, of the Westinghouse Electric & Mfg. Co., with this new method, when the thermoguard operates through overheating of the motor, the control disconnects the motor from the line and then connects it to run in the reverse direction. Running in this direction at high speed, it is soon cooled by the fan on the motor. The installation of this control requires no change or additions to the original line starters; only extra relays are necessary.

* * *

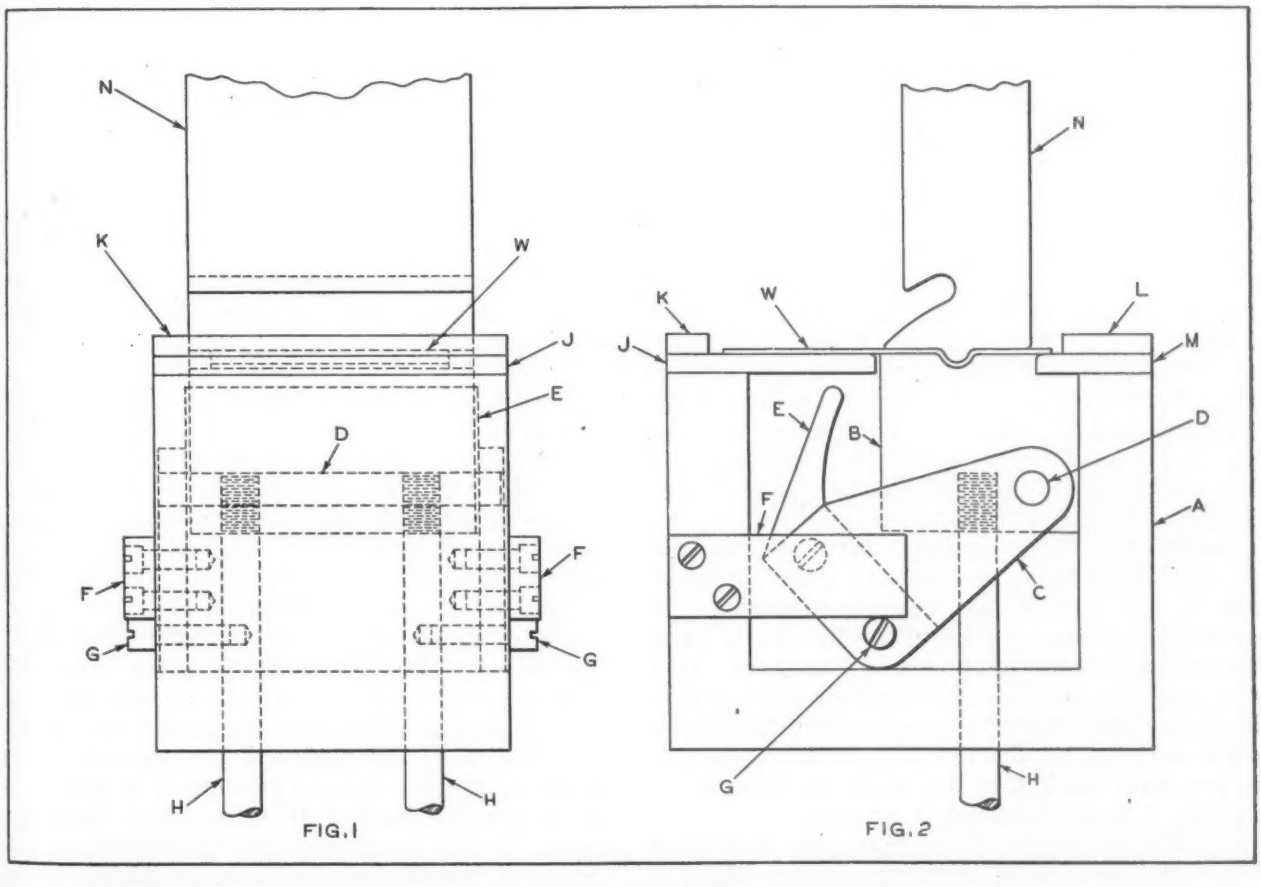
Bamboo rod fishing poles are now being made permanently proof against moisture and bacterial attack by impregnation with plastic resins. These resin-treated rods do not come apart, warp, or split.

Die for Forming Clip

By L. KASPER, Philadelphia, Pa.

The die shown in the front and end views, Figs. 1 and 2, is designed to form the clip seen in Fig. 5 at one stroke of a single-action press. The body *A* of the die serves as a housing for the floating block *B*, which is guided in a vertical path by two rods *H*. The rods *H* pass through the bolster plate of the press, and are backed up by rubber cylinders or springs, which serve to return block *B* to the position shown in Fig. 2 on the upward stroke of the press ram after the forming operation has been completed.

Plates *J* and *M* at the top of die body *A* sup-



Figs. 1 and 2. Front and End Views, Respectively, of Die for Forming Clip Shown in Fig. 5

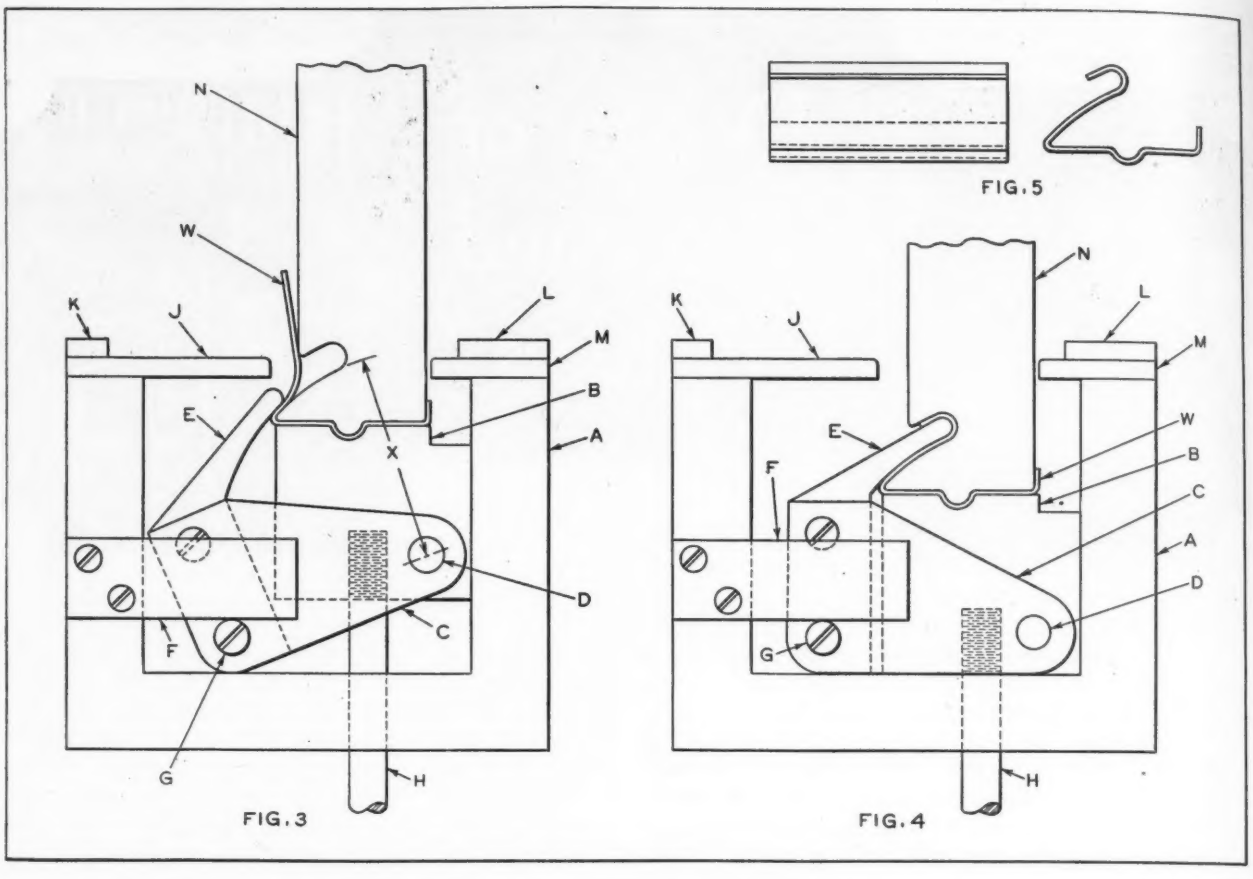


Fig. 3. Forming Die with Punch Started on Downward Stroke. Fig. 4. Die with Punch Shown at End of Forming Stroke. Fig. 5. Clip Formed from Metal Blank in One Stroke of Press

port the flat material to be formed, and act as forming edges for bending the material around the corners of punch *N*. Plate *M* also serves to limit the upward movement of block *B*. Plates *K* and *L* are used to locate the material in the proper position for forming.

Block *B* carries a stud *D*, on which the brackets *C* swivel. Forming plunger or punch *E* is supported between brackets *C*, and is attached to them by countersunk screws at the top and by fillister-head screws *G* at the bottom. Screws *G*, which are in contact with the lower edges of plates *F*, force the brackets *C* to swivel about the stud *D* as a center when vertical motion is imparted to block *B*.

Referring to Figs. 1 and 2, after the material *W* has been placed between the guide plates *K* and *L*, the semicircular bead is formed as the press ram moves downward. The convex form on the under side of punch *N* forces the material into the semicircular groove on the top of block *B*. The rubber cylinders under the bolster plate of the press are set with sufficient tension to maintain block *B* in the upper position shown in Fig. 2 until the bead is formed.

In Fig. 3, punch *N* is shown as it appears after having entered the die. As the edges of punch *N* pass the upper edges of plates *J* and *M* the material is formed around the corners of the punch. The downward movement of punch *N* forces block *B* down against the resistance of the rubber cylinders at the ends of rods *H*. As brackets *C* are in contact with the bottom of the groove in die body *A* and are free to swivel on stud *D*, the downward movement of block *B* produces a movement of brackets *C* and forming punch *E* in a circular path, of radius *X*, around the center of stud *D*.

Stud *D* must be positioned on the center of the arc of the forming surface of punch *N* when the material is being pressed against block *B*, as indicated in Fig. 3. As the movements of brackets *C* are produced by the traversing movement of block *B*, actuated by punch *N*, the timing of these three members is synchronized throughout the operating cycle.

In Fig. 4, punch *N* is shown at the end of its downward travel. Block *B* has come in contact with the bottom of the groove in die body *A*, and forming punch *E* has completed the operation of forcing the material into the groove in punch *N*. On the upward movement of punch *N*, the forming punch *E* is withdrawn from the groove in the punch through the action of the screws *G*, which come in contact with the lower edges of plate *F*, thus preventing the forming

punch from being raised when punch *N* ascends. This upward movement causes the forming punch *E* to simply rotate around the center of stud *D* in the reverse direction. As punch *N* reaches its extreme upper position, the work *W*, which is now completely formed to the finished shape shown in Fig. 5, is slid off the punch member.

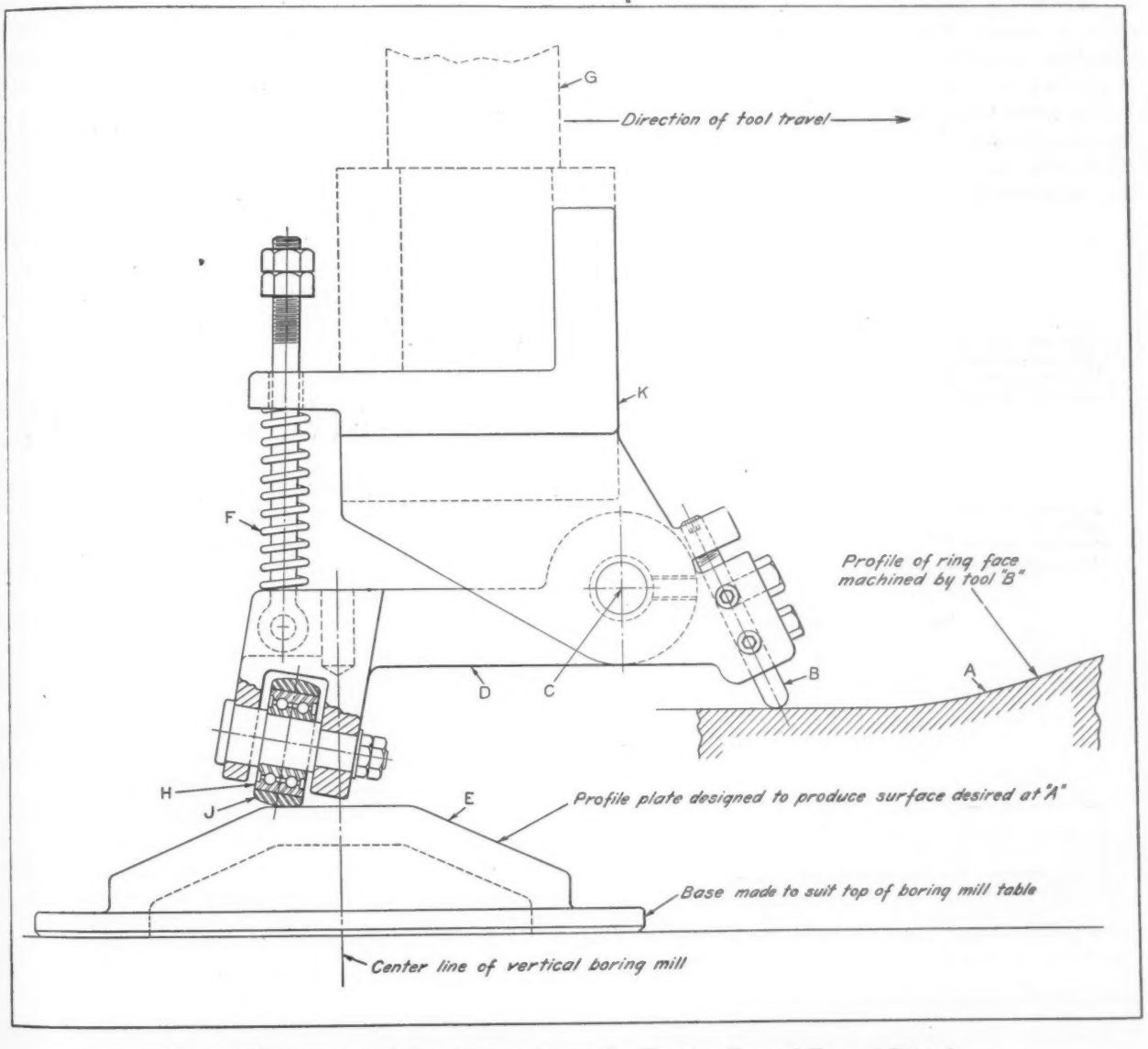
Profile Turning Attachment for Boring Mill

By W. C. BOSWORTH, Cleveland, Ohio

A profile turning tool designed for turning formed faces of large rings on a boring mill is shown diagrammatically in the accompanying illustration. This attachment has only three principal moving members—the tool-holder *D*, the roller *J*, and the body *K* of the tool. The profile plate *E* is fastened to the center of the boring mill table and rotates with the work *A*. The body *K* of the tool is clamped to the ram *G* of the boring mill and moves only in a horizontal direction, the ram being locked to prevent vertical movement. The movement of holder *D* about the hinge-pin *C* depends upon the shape of the profile plate *E*.

The follower end of the tool-holder has a double ball bearing *H* with a sleeve *J* assembled on the outer race with a press fit. This sleeve has a curved or radial surface that provides a smooth contact with profile plate *E*. The spring *F* keeps the roller, or sleeve, in contact with the profile plate.

The height of the center of pin *C* is adjustable to the correct position, and is never changed after being properly located. As stated, the ram always travels in a horizontal direction, and since it is locked against vertical movement,



Boring Mill Set-up with Special Attachment for Turning Formed Face of Ring A

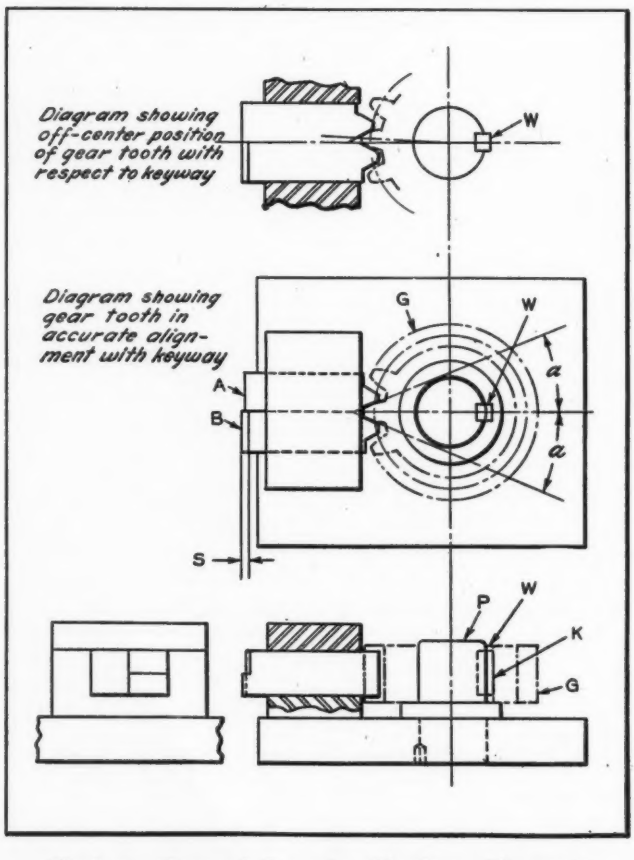
practically all lost motion is eliminated. The tool bit *B* is adjusted and locked in position, so that it need not be changed after the set-up, except to compensate for wear and for adjustment after sharpening.

Gage for Checking Alignment of Gear Teeth with Keyway

By ERNEST BERGER, Detroit, Mich.

The gage shown in the accompanying illustration was designed to check the alignment of the teeth of an involute spur gear *G* with its keyway at *W*. The two gaging slides *A* and *B* can move independently of each other in the guide member. The angle *a* to which they are ground at one end equals the pressure angle of the gear to be checked. The ground ends of the slides form the equivalent of one tooth space of a mating involute rack. The opposite end of slide *A* is flat, while that of slide *B* has a step equal to dimension *S*. The working principle is similar to that of a feeler gage.

The gear to be tested is located on plug *P* by key *K* of the fixture, after which both gage slides are pushed against the tooth flanks. If the alignment of the keyway with the tooth diametrically opposite the key is within the allowed limits, the flat end of slide *A* will be located between the top and the step on slide *B* which represents the tolerance *S*.



Flush-pin Type of Gage for Checking Alignment of Keyway with Gear Tooth

* * *

WPB Ruling on the Making of Post-War Experimental Models

The War Production Board recently issued rules under which manufacturers may be authorized to produce post-war experimental models if they do not divert man-power or facilities for war work to do so.

These rules, contained in Priorities Regulation No. 23 (which may be obtained from the War Production Board, Washington, D. C.), grant blanket authorization to any person or firm to engage in the production of models that War Production Board regulations heretofore prevented them from making. It is provided, however, that such activity must not involve an expenditure of more than $5000 a month in a single plant, including all direct costs, such as materials, component parts, sub-assemblies, labor, and design and drafting work.

Authorization to make experimental models costing more than $5000 a month in a single plant may be obtained from the War Production Board by sending four copies of an application to the field office nearest to the plant in which the work is to be done. Application forms known as WPB-3879 may be obtained from the field offices.

In connection with the permission to produce experimental models when the work does not interfere with the output of war or essential civilian goods, the War Production Board provides as follows:

1. Only the minimum number and minimum size of models necessary to prove the suitability of the article for commercial production or use may be made. This does not permit trial production runs of experimental models.
2. Materials made available specifically for another purpose may not be used to make experimental models.
3. Models may not be distributed to promote sales or create demand, and shall not be displayed to the trade or the public. Production of samples is specifically prohibited.
4. Models of houses, buildings, or structures involving construction may not be made under these rules. Experimental construction jobs will continue to be governed by provisions of Order L-41.

* * *

Plastic bottles, one-third the weight of glass and much stronger, are now being made.

Formula for Checking Width of Tapered Slot with a Ball or Pin

By O. ENGELHARD

The measuring instruments ordinarily used in the tool-room are not adapted for direct accurate checking of the maximum width of a tapered slot or the base diameter of a conical cavity machined in a flat surface. By using a ball or sphere, as shown in the accompanying diagram, and applying a simple formula, height H can be readily calculated, thus providing a dimension that can be easily measured. A sphere must, of course, be used in checking a conical hole or cavity, whereas either a sphere or an accurate cylindrical plug or pin can be used in checking a slot. The formulas, however, apply to either a sphere or a cylinder.

Referring to the diagram, A = included angle of slot or cone; $B = 1/2\ A$; C = distance from plain or flat surface to the point of tangency of the sphere; S = base diameter of cone, or maximum width of tapered slot; R = radius of sphere or pin; H = distance from top of sphere to plain or flat surface.

Now, assuming that angle A is known, that it is accurately bisected by the vertical center line, and that the diameter of the sphere has been accurately determined, height H for a given measurement S can be found by the following formula:

$$H = R + \frac{R}{\sin B} - \frac{S}{2} \times \cot B$$

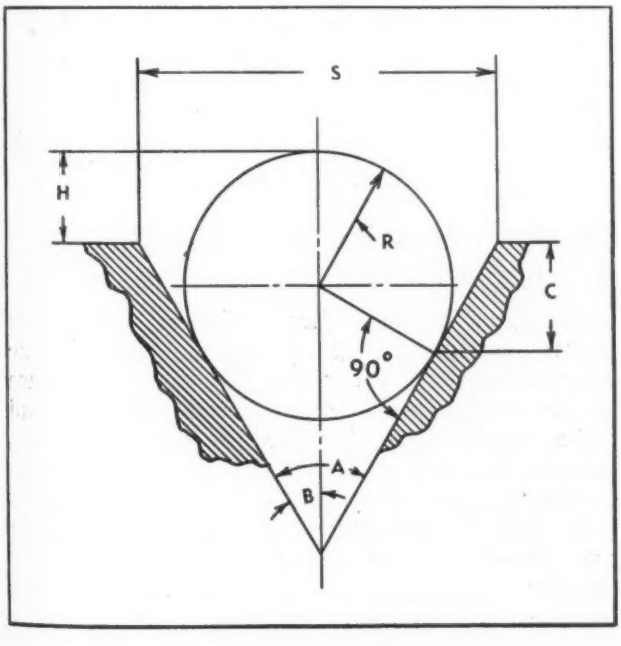


Diagram Illustrating Method of Using Ball to Check Maximum Width of Tapered Slot or Base Diameter of Conical Cavity

The dimension C, if desired, can be found by the formula

$$C = \frac{\frac{S}{2} - R \times \cos B}{\tan B}$$

* * *

Tool Engineers Plan Semi-Annual Meeting

The American Society of Tool Engineers, with headquarters at 2567 W. Grand Blvd., Detroit 8, Mich., will hold its twelfth semi-annual meeting at the Hotel Syracuse, Syracuse, N. Y., October 12 to 14. The papers to be presented at the meeting will be devoted to methods for producing war material and to equipment especially adapted for operation by women and unskilled operators. During the first day, the board of directors of the Society will meet. The technical sessions will begin Friday, October 13, at 10 A.M., and will be held during the forenoon, afternoon, and evening, continuing Saturday morning and afternoon.

Among the papers to be presented will be one dealing with the machining of magnesium alloys. Another paper of interest to all tool engineering executives will discuss tool engineering education. The semi-annual dinner will be held Saturday evening, October 14, when James Y. Scott, president of the Van Norman Co., Springfield, Mass., and president of the National Machine Tool Builders' Association, will be the speaker. Mr. Scott is also a member of the American Society of Tool Engineers.

* * *

Record of Government-Owned Machine Tools

A card record system by which Government-owned machine tools available for transfer can be located quickly has been established by the War Production Board. This card index will show instantly what machine tools are available and where they are located. The cards will be prepared in duplicate and distributed to the field offices of the War Production Board and others charged with recording increases and decreases in available machine tools.

The new system will provide an up-to-date and accurate check on the whereabouts and quantity of Government-owned machine tools usable in war production, and will often obviate the necessity of authorizing the purchase of new equipment. Coincident with the installation of this card record system, the Available Tools Section, Tools Division, will discontinue publication of the WPB Available Tools List.

Materials of Industry

THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

"Paraplex G-25"—A New Plasticizer for Synthetic Rubber Field

A new resin plasticizer, known as "Paraplex G-25," has been developed by the Resinous Products & Chemical Co., Philadelphia, Pa. This synthetic resin possesses high resistance to oils, gasoline, and heat. It already shows promising results when used in polyvinyl chloride cable compounds and cable lacquers, wire enamels, vinyl resin fabric coatings, hot-melt compositions, aircraft gaskets, and calking and sealing compounds. 201

Rust-Preventive Compound for Cutting Coolants

A new rust-preventive compound has been developed by the Machinery Supplies Co., 501 Madison Ave., New York 22, N. Y., for addition to water soluble cutting oils. The new ingredient, known as "Ru-Pre-Sol," is used in the proportion of about one-eighth of 1 per cent of the whole solution, while the percentage of water soluble cutting oil used is about 1 to 3, depending upon the material being machined. The liquid dries on the surface of the work, forming a tight but invisible protective film. 202

Dyes for Acrylic and Cellulose Acetate Plastics

Two types of dyes have been developed by the Krieger Color and Chemical Co., 6531 Santa Monica Blvd., Hollywood 38, Calif., for coloring plastics after fabrication. One of these, known as "Lucidip," is used in dyeing acrylic plastics, such as Lucite and Plexiglas. The other—a special acetate liquid dye—is employed in coloring the various cellulose acetate plastics. In the case of the acrylic plastics, dyeing is accomplished by immersing the part to be colored in the liquid dye at room temperature for a period of five minutes or more, depending upon the depth of color wanted. Cellulose acetate plastics require only one to thirty seconds immersion to obtain shades ranging from pastel to dark colors. Each type of dye is available in a range of twelve colors. 203

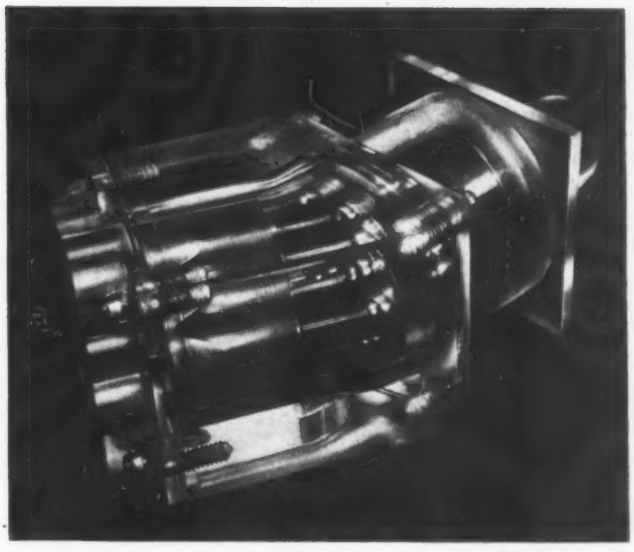
Plexiglas Masking Jigs for Use in Copper-Plating

Plexiglas masking jigs are used extensively in the copper-plating of carbon rings by the Morganite Co., Long Island City, N. Y. Because of its machinability, dimensional stability, and light weight, Plexiglas has been found advantageous for this purpose, and has aided in reducing rejected parts and stepping up production. Other advantages of the Plexiglas jigs are durability and resistance to the plating solution. 204

General Electric's Use of Plastics for Trench Mortar Fuses has Saved More than 16,000,000 Pounds of Bar-stock Aluminum

To obtain additional information on materials described on this page, see lower part of page 198.

Transparent Plexiglas Models Used for Instruction Purposes Reveal Every Moving Part in This Hydraulic Pump. The Parts All Move Normally



Synthetic-Rubber Latex Insulation for Electric Wire and Cable

A synthetic-rubber latex insulation for lighting, power, and communication cable, known as "Nubun," has been developed by the United States Rubber Co., Rockefeller Center, New York City. This insulation is the result of wartime developments in rubber technology, and will permit the design of new types of wire and cable with improved electrical and physical characteristics. Nubun insulated wire will have great advantages over ordinary wire where space is important. Furthermore, fire alarm and telephonic systems can be more easily replaced, and will have greater resistance to destructive forces when made with the new insulation.

The outstanding qualities of Nubun insulation are flexibility, impermeability to water, laminated construction, and perfect centering of the conductor to produce an insulated wire of maximum conductivity and minimum diameter. The insulation has high dielectric strength and insulation resistance, and will withstand severe wear. It is made from a modification of Buna S synthetic rubber. 205

New Impact-Resistant Plastic Material for Handwheels

A new high-impact resistant plastic material, Kys-Ite K101, is being manufactured by the Keyes Fibre Co., Waterville, Me. This is a wood pulp, Durez-resin impregnated compound having properties superior to those of the previously developed Kys-Ite.

The improved product was developed for the manufacture of valve handwheels on destroyers, heretofore made of aluminum. Tests on the new material have shown that it has a heat conductivity 1000 times less than aluminum, and is not affected by immersion in boiling water for twenty-four hours or by temperatures as low as —40 degrees F. It is unaffected by oils, gasoline, ethyl alcohol, acetone, xylol, carbon tetrachloride, and pyridine. It is slightly affected by weak acids and weak alkalies, but shows little or no change when subjected to strong reducing and organic acids. Strong oxidizing acids and strong alkalies cause decomposition.

Physical tests have shown that the new plastic material has a tensile strength of 12,000 pounds per square inch, and a flexural strength of 35,000 pounds per square inch flatwise, 19,000 pounds per square inch edgewise, and 23,000 pounds per square inch endwise. . . .206

Transparent Plastics Used in Models for Educational Purposes

Models of parts used for visual education are now being constructed from transparent plastics. These models have proved to be of great aid in teaching students at the various Ford Motor Co. and Army training schools. Valves, hydraulic pumps, and other parts, the actions of which are difficult to explain to students, have been made up from transparent Plexiglas, showing the internal details. These models have greatly accelerated the speed with which students are able to grasp the principles involved. In this way, ball bearings, sleeves, rods, and springs located within the mechanism can be clearly shown to the students in their true operating position. Furthermore, in teaching such subjects as mechanical drawing, transparent models make angles and planes of intricate figures clearly visible in any projection. . . .207

Stop-Off Lacquer for Use in Hard Chrome-Plating

A new clear red, stop-off lacquer, specifically developed for the masking of parts for hard chrome-plating, has been announced by the Michigan Chrome & Chemical Co., 6340 E. Jefferson Ave., Detroit, Mich. The new lacquer, known as "Miccrome," can be applied easily by brushing, dipping, or spraying. It offers fast air-drying qualities. During plating operations, it adheres even to surfaces that have been chrome-plated.

After plating, Miccrome can be easily peeled or dissolved. It can be removed from spots that are hard to reach by hot soaking for a short time and then blowing the remaining material off with compressed air. Because of this feature, clean-up time is reduced to a minimum. . . .208

To obtain additional information on materials described on this page, see lower part of page 198.

New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 197 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the September Number of MACHINERY

Hydraulic Presses and Shears

WATSON-STILLMAN CO., Roselle, N. J. Bulletin 650A, on hydraulic presses for extruding and molding ceramics. Bulletin A-6, on hydraulic and hand shears for cutting wire rope. Bulletin 230-A, illustrating and describing several types of hydraulic gages. Bulletin 330-A, on the Watson-Stillman vertical horizontal hydraulic press. 1

Tapping and Threading Machines

WARNER & SWASEY CO., 5701 Carnegie Ave., Cleveland 3, Ohio. Catalogue No. 4401, on precision tapping and threading machines for extreme accuracy on a mass-production scale. Catalogue No. 4402, on No. 10 precision tapping and threading machines. 2

Shears

HILL ACME CO., CANTON DIVISION, 6048 Breakwater Ave., Cleveland 2, Ohio. Folder on sheet and plate shears; folders on No. 11 and No. 22 alligator shears; and folder entitled "Instructions for the Lubricating, Adjusting, and Erecting of 'Canton' Alligator Shears."....3

Abrasion-Resistant Plasticized Fabric

SOUTHERN FRICTION MATERIALS CO., Box 1475, Charlotte 1, N. C. Circular giving physical properties and specifications covering Cotton-leather fabric, a new abrasion-resistant plasticized fabric for industrial applications. 4

Heat-Treating Furnaces

SURFACE COMBUSTION, 2375 Dorr St., Toledo 1, Ohio. Bulletin SC-117, on Surface Combustion furnaces in the steel wire industry. Circular SC-118, "Applied Gas Chemistry of Prepared Atmospheres in Surface Combustion Furnaces."....5

Lubrication

SUN OIL CO., 1608 Walnut St., Philadelphia 3, Pa. Booklet entitled "A Complete Plan to Help You Save Equipment, Time, and Labor"—one of a series of booklets in a "Save and Serve with Proper Lubrication" campaign. 6

Carbide-Tipped Lathe and Grinder Centers

METAL CARBIDES CORPORATION, 107 E. Indianola Ave., Youngstown 5, Ohio. Folder 44-C, containing prices and specifications covering standard Talide-tipped lathe and grinder centers. 7

Power Transmission Equipment

AMERICAN PULLEY CO., 4200 Wissahickon Ave., Philadelphia 29, Pa. Catalogue HT-44, "Hi-Torque Motor Pulleys"; catalogue FBD-44, "Flat Belt Drive Equipment"; bulletin SJ-44, "Speed-Jack Drives."..8

Seam-Welder Electronic Controls

WELTRONIC CO., 19500 W. Eight Mile Road, Detroit 19, Mich. Bulletin WT-40-41, covering the application, operation, and special features of this company's full-electronic seam-welder controls. 9

Heating Units for Industrial Processes

FOSTORIA PRESSED STEEL CORPORATION, Fostoria, Ohio. Circular on Model P-7-IR portable infra-red heating unit, which has many applications in every industrial plant and repair shop. 10

Visible Oilers

TRICO FUSE MFG. CO., 2948 N. 5th St., Milwaukee 12, Wis. Bulletin 27-A, describing wick-feed visible oilers for automatically lubricating solid, wick, and waste-packed bearings. 11

V-Belt Drives

ALLIS-CHALMERS MFG. CO., Milwaukee 1, Wis. Bulletin B6331, on five types of Texrope V-belts. It also covers the Magic-Grip sheave and the speed-changing methods used in Allis-Chalmers sheaves..12

Drilling and Honing Equipment

BARNES DRILL CO., 814 Chestnut St., Rockford, Ill. Catalogues in Spanish and Portuguese on drilling and honing machines built by the company. 13

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LEONARD PRECISION PRODUCTS CO., 1100 Larson Ave., Garden Grove, Calif. Bulletin on the Leonard-Douglas Bendmaster, which is quickly adaptable to all standard bending tools. 14

Hydraulic Gear Pumps

HYDRO-POWER SYSTEMS, INC., DIVISION OF HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio. Bulletin 440, containing data on Hydro-Power gear pumps for medium-pressure hydraulic applications..15

Drying and Preheating

FOSTORIA PRESSED STEEL CORPORATION, Fostoria, Ohio. Publication NP-2 entitled "The Near Infra-Red

Process for Baking, Drying, Preheating, and Dehydration." ——16

Thread Chasers

LANDIS MACHINE Co., Waynesboro, Pa. Booklet entitled "More Production from Landis Chasers," giving specific directions regarding the proper use of tap and die chasers. ——17

Heat-Treating Guide

CARPENTER STEEL Co., 105 W. Bern St., Reading, Pa. Heat-treating Guide, giving detailed information for heat-treaters, tool engineers, and tool-room foremen on the heat-treatment of tool steels.——18

Worm-Gear Reduction Units

CLEVELAND WORM & GEAR Co., 3276 E. 80th St., Cleveland 4, Ohio. Catalogue No. 300 on Speedaire fan-cooled worm-gear reduction units. ——19

High-Speed Steel and Gage Steels

JESSOP STEEL Co., Washington, Pa. Bulletin on Purple Label Extra high-speed steel. Circular on Jessop precision gage stock. ——20

Pickling Solution Heating

SUBMERGED COMBUSTION Co. OF AMERICA, INC., Hammond, Ind. Bulletin on an improved method of heating and agitating pickling solutions and evaporating liquids.——21

Electric Furnaces

HEVI DUTY ELECTRIC Co., Milwaukee 1, Wis. Bulletin HD-644, on Hevi Duty car bottom furnaces. Bulletin HD-744, descriptive of Hevi Duty convection tempering furnaces. ——22

Speed Reducers

WINFIELD H. SMITH, INC., Springville, Erie County, N. Y. Catalogue and Engineering Manual No. 144, containing a vast amount of information on speed reducers. ——23

Shock-Absorbing Hammers and Mallets

GREENE, TWEED & Co., Bronx Blvd. at 238th St., New York 66, N. Y. Bulletin on Basa hammers and Empire plastic mallets. ——24

Controlling Magnesium Dust

PETERS-DALTON, INC., 628 E. Forest Ave., Detroit 1, Mich. Booklet entitled "The Collection and Control of Dust and Fumes from Magnesium Alloy Processing." ——25

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MEEHANITE RESEARCH INSTITUTE OF AMERICA, INC., Pershing Square Bldg., New Rochelle, N. Y. Bulletin 19, entitled "Meehanite Castings vs. Welded Construction." ——26

"Blind" Fasteners

B. F. GOODRICH Co., Akron, Ohio. Catalogue Section 12050, descriptive of the Rivnut, a "blind" fastener which serves as a nut-plate, a rivet, or both. ——27

Sump Tank Cleaning Equipment

W. R. CARNES Co., 2066 Helena St., Madison 4, Wis. Circular descriptive of the Carnes cleaning machine for machine tool sump tanks. ——28

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GREER PRODUCTS CORPORATION, 39 W. 60th St., New York 23, N. Y. Circular describing Greer hydraulic accumulators for portable and stationary equipment. ——29

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LEWIS-SHEPARD PRODUCTS INC., 288 Walnut St., Watertown 72, Mass. Folder on floor trucks, lift trucks, and other materials-handling equipment. ——30

Spot-Welding Machines

EISLER ENGINEERING Co., Newark, N. J. Catalogue CE-44W, containing fifty-eight pages of data on spot-welding machines made by this company. ——31

Temperature Regulating Switches

FENWALL, INC., Ashland, Mass. Catalogue on Fenwall thermo-switches for temperature and pressure control. ——32

To Obtain Copies of New Trade Literature

listed on pages 196-198 (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue to:

MACHINERY, 148 Lafayette St., New York 13, N. Y.

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[This service is for those in charge of shop and engineering work in manufacturing plants.]

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Business Address.....

City.....*State*.....

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Cutting Tools

PIPE MACHINERY CO., 930 E. 70th St., Cleveland 8, Ohio. Bulletins on inserted-blade milling cutters and ground-thread milling cutters. 33

Electric Welding

LINCOLN ELECTRIC CO., Cleveland 1, Ohio. 48-page book giving complete information on "Fleet-Welding." 34

Cold-Finished Steel Bars

MONARCH STEEL CO., Indianapolis and Hammond, Ind. Bulletin on "Speed Case and "Speed Treat" cold-finished steel bars. 35

Storage Battery Welding

PROGRESSIVE WELDER CO., 3050 E. Outer Drive, Detroit 12, Mich. Bulletin 902, "The How and Why of Storage Battery Welding." 36

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DETREX CORPORATION, 13005 Hillview Ave., Detroit 27, Mich. Bulletins entitled "Triad Alkali Cleaners" and "Solvent Degreasing." 37

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ALDRICH PUMP CO., Allentown, Pa. Bulletin No. 50 entitled "Aldrich Hydraulic Handbook." 38

Cutter Grinding

O. K. TOOL COMPANY, INC., Shelton, Conn. Booklet giving detailed instructions on how to grind inserted-blade milling cutters. 39

Precision Gage-Blocks

PRATT & WHITNEY DIVISION NILES-BEMENT-POND CO., West Hartford 1, Conn. Circular descriptive of the Pratt & Whitney inspection service for precision gage-blocks. 40

Hacksaw Machines

COVEL MFG. CO., Benton Harbor, Mich. Bulletin 5-44, descriptive of "Excel" power hacksaws; also bulletin containing information on precision vises. 41

Electric Welding

HOBART BROS. CO., Troy, Ohio. Booklets entitled "Welders' Vest Pocket Guide" and "Modern Industries Sew with Steel." 42

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ZAGAR TOOL, INC., 23880 Lakeland Blvd., Cleveland, Ohio. Circular descriptive of the Zagar collet speed chuck. 43

Rotary Files

ROTARY FILE CO., Stratford, Conn. Catalogue on hand-cut rotary files and rotary files ground from the solid. 44

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CYCLONE FENCE DIVISION, American Steel & Wire Co., Waukegan, Ill. Catalogue 3, on metal conveyor belt. 45

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HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio. Bulletin entitled "Faster Speeds for 194X Metal-Working Production." 46

External Indicating Gages

METRICAL LABORATORIES, INC., Ann Arbor, Mich. Circular on external indicating snap gage type gages. 47

Carbide Tools

WHITMAN & BARNES, 2108 W. Fort St., Detroit 16, Mich. Circular on carbide-tipped reamers. 48

Retaining Rings

NATIONAL LOCK WASHER CO., Newark, N. J. Bulletin on annealed retaining rings. 49

Spring Data

ACCURATE SPRING MFG. CO., 3811 W. Lake St., Chicago 24, Ill. Handbook of data on springs. 50

Pneumatic Tools

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Socket-Screw Products

WESTERN AUTOMATIC MACHINE SCREW CO., Elyria, Ohio. Catalogue on socket-screw products. 50-B

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described on pages 199-226 is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in September, 1944, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on other side of this blank.

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on pages 194-195, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning name of material as described in September, 1944, MACHINERY.

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[SEE OTHER SIDE]

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Logansport Special Hydraulic Gaging and Assembling Press

The special hydraulic gaging and assembling press shown in the accompanying illustration was developed and built by the Logansport Machine Co., Inc., 910 Payson Road, Logansport, Ind., for one of the leading manufacturers of aircraft engines. The machine has a dual function—the press fit assembly of a splined shaft into a splined hole of a disk-shaped part at certain predetermined but adjustable pressures, and the disassembly for tear-down inspection of these parts after the "green run" test of the engine.

Three indicating lights are provided to show the type of fit obtained. An amber light indicates that the press fit is too free; a green light indicates a fit within the correct limits; and a red light shows that the fit is too tight. When the red light goes on, the pressing stroke of the hydraulic cylinder is automatically stopped.

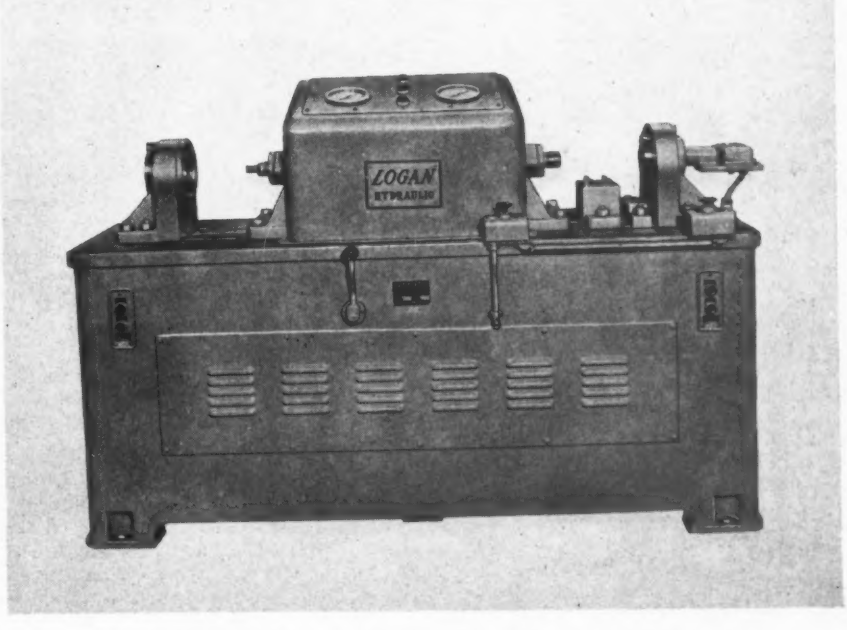
The press has two independent hydraulic systems, each consisting of a motor-driven pump mounted on an oil reservoir, an adjustable pressure control valve, an operating valve, and a hydraulic cylinder. The two cylinders are mounted on the table top in the center and covered by a hood which also carries the pressure gages and indicating lights. The two standard hydraulic power units are located in the base of the machine, as are also the operating valves.

The right-hand side of the machine is designed for assembling, and the left-hand side for disassembling. The control valve for assembling is operated through electric push-buttons, while the valve for disassembling is operated by a hand-lever. Two adjustable, snap-action type, double-pole, heavy-duty pressure switches are installed near the cylinders under the hood, and are actuated by the oil pressure of the assembly cylinder. These switches, together with a suitable contactor, operate the controlling lights and stop the pressing stroke of the assembly cylinder when the press fit becomes too tight. A precision limit switch, mounted on an adjustable bracket on the work-holding fixture, serves to prevent the red light from going on at the end of the cylinder stroke.

Work-holding fixtures with interchangeable locating bushings and collars for different pieces are provided on each end of the machine, as are interchangeable support blocks for the shaft being assembled. The motor starters for the two power units and the electric relay for the indicating lights are contained in an accessible panel box at the rear of the machine. A small hydraulic intensifier in the base serves to boost the low oil pressure used for assembling to a higher value for more accurate operation of the pressure switches. Large louvered removable side plates on the front and rear of the machine, as well as removable end plates, make the power units and valves in the base of the machine accessible for adjustment or servicing. The two pressure gages have transparent plastic covers. The machine is finished in the new light machine tool gray.....51

Lester Die-Casting Machines

Two high-speed, high-pressure die-casting machines—one for zinc, tin, and lead alloys, and the other for aluminum, brass, and magnesium alloys—have been developed by the Lester Engineering Co. for Lester-Phoenix, Inc., 2711 Church Ave., Cleveland, Ohio. Both machines are convertible, if required, the one from zinc operation to



Combination Gaging and Assembling Press Developed by the Logansport Machine Co., Inc.

To obtain additional information on equipment described on this page, see lower part of page 198.

aluminum, and the other from aluminum to zinc. These machines are smaller and lighter in weight than the larger Lester-Phoenix machines, but have similar features, and are designed specifically for the high production of smaller castings.

The zinc machine, in actual operation, makes from 400 to 500 "shots" per hour. The molten metal is injected by means of a submerged plunger and gooseneck injection system. Injection pressures range from 2200 pounds per square inch for a 4-pound casting to 1400 pounds per square inch for a 6-pound casting.

The aluminum machine differs from the zinc machine in that it has a cold chamber injection system instead of the submerged plunger and gooseneck system. Injection pressures up to 20,000 pounds per square inch can be used. ---------- 52

DoAll Precision Surface Grinder

A Model G-1 DoAll surface grinder, designed to make possible new achievements in precision grinding and fine finishing by embodying recent scientific developments in balance and construction, has been brought out by Continental Machines, Inc., 1312 S. Washington Ave., Minneapolis 4, Minn. Equipped with standard grit wheels, the machine will produce a fine finish to within 6 microinches. A new feature permits more convenient and closer inspection of the work while grinding.

The grinder is built for toolroom use and light production work where accuracy is paramount. It has a longitudinal table travel of 21 inches and a cross-feed of 7 1/2 inches. The vertical wheelhead adjustment is 12 inches, using a 7- by 1/2- by 1 1/4-inch wheel. The extreme rigidity so important in obtaining precision finish is attained by the scientific balancing of the 2200-pound machine. The 21-inch longitudinal travel and 7 1/2-inch cross-feed travel allows sufficient working area for grinding parts on the 6- by 18-inch chuck.

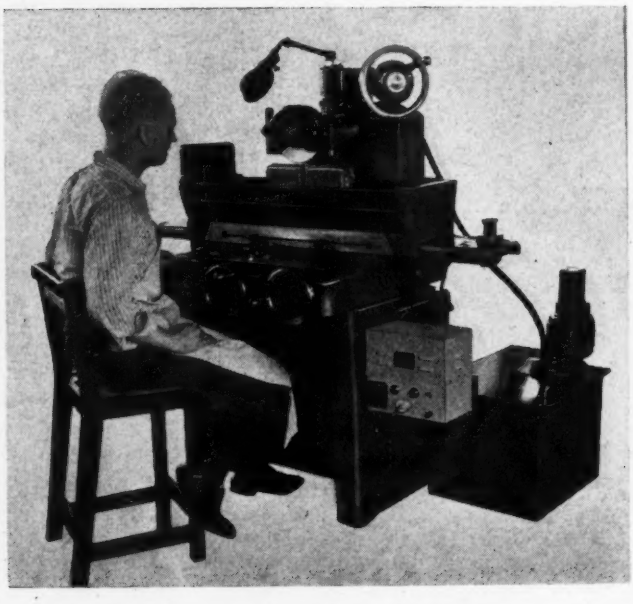
An especially constructed hydraulic control system eliminates the piping usually required on surface grinders of this type. The hydraulic unit controls the five hydraulically actuated movements of the machine, and was designed specifically for this grinder. When the surface grinder operates automatically, the cross-feed screw is automatically disengaged, thus prolonging the life of this member. Standard equipment includes a direct motor drive and precision ball-bearing spindle.

The grinder head is built especially to suit the spindle, and is lapped to a precision fit. The wheelhead is raised and lowered by a graduated handwheel. Gears are hardened and ground, and the vertical adjustment screw operates in a bronze nut 4 inches long, designed to minimize wear. An important feature is the adjustable wheel guard, which can be lowered to compensate for wheel wear or adjusted for individual applications. The guard can be removed without taking off the wheel.

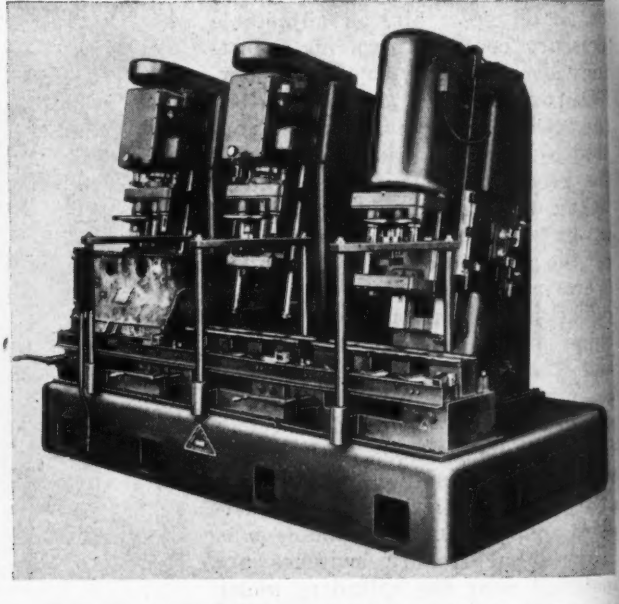
The saddle extends only 8 1/2 inches from the table, leaving a clear view of the work. The grinder can be quickly changed from full hydraulic operation to full manual operation, and is designed for either wet or dry grinding. The built-in hydraulic oil reservoir and pump unit is rubber-mounted to prevent vibration from being transmitted to the work-piece. Complete automatic pressure lubrication is provided for all the ways and moving parts. ---------- 53

LeMaire Three-Station Cylinder-Block Drilling and Reaming Machine

Holes in huge truck-engine cylinder blocks can be rough-drilled through the solid casting, then semi-finish and finish-reamed, all in one cycle, on a large three-station machine recently developed by



DoAll Precision Surface Grinder Brought out by Continental Machines, Inc.

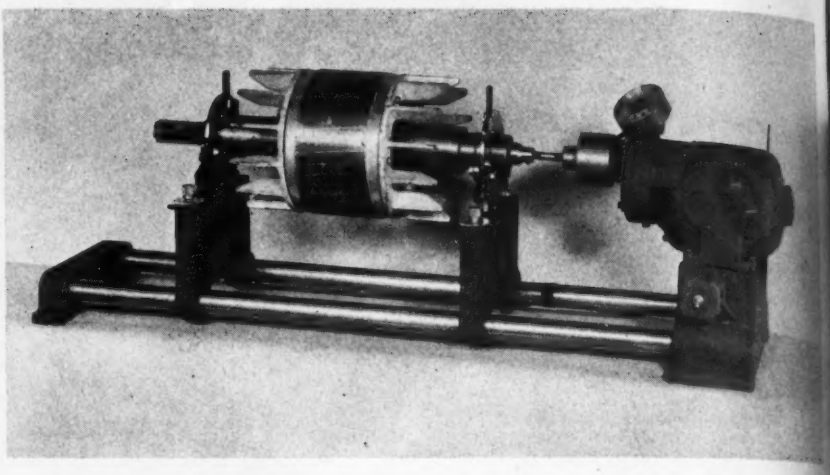


Cylinder-block Drilling and Reaming Machine Built by LeMaire Tool & Mfg. Co.

To obtain additional information on equipment described on this page, see lower part of page 198.

the LeMaire Tool & Mfg. Co., 2671 S. Telegraph Road, Dearborn, Mich. The machine, being conveyor-indexed, provides a progressive set-up that eliminates transferring heavy parts from one machine to another.

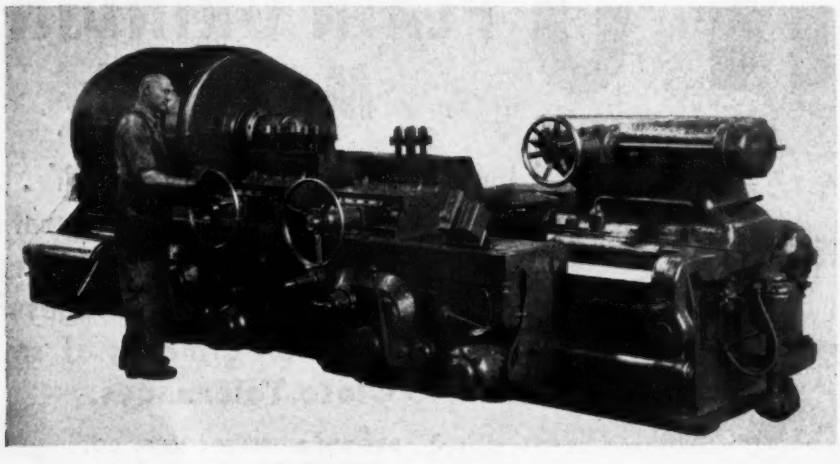
The first station is used to drill four holes through the solid surface of the casting. One of the holes is also counterbored and spot-faced to a diameter of 2 3/8 inches. The second station, equipped with a four-spindle head, semi-finish reams the holes. The third station finish-reams two 1 1/4-inch holes and two 2-inch holes within a limit of 0.001 inch. The drill heads in the first two stations are driven by standard No. 5000 "Twin Ram" hydraulic power units, mounted at a 10-degree angle on the faces of the columns. The third station has a unit that slides on machined ways, 63 inches long and 4 inches wide, which are spaced 16 inches apart. All four holes are finished in one casting at each complete cycle of the machine. 54



Globe Dynamic Balancing Machine Designed for Repair Shop Work

Wickes Heavy-Duty Lathes

A heavy-duty lathe adapted for rough-turning heavy work, including the largest size high-explosive shells, has just been added to the line built by Wickes Brothers, Saginaw, Mich. The lathe is driven by a 75-H.P. motor, and has alloy steel gears throughout and anti-friction bearings on all high-speed shafts. A hydraulic expanding mandrel is used for driving the work, which is chucked on the mandrel and supported on a dead center in the tailstock. There are two heavy-duty carriages and aprons having independent automatic feeds with power rapid traverse and quick-change gear-boxes. One carriage is fitted with a cam arrangement that feeds the tool along a curved line for forming work such as the nose of a shell. All controls are designed for easy operation. The machine requires a floor area of about 160 square feet, and with electrical equipment weighs approximately 52,000 pounds. 55



Wickes Heavy-duty Lathe Equipped with Two Carriages Having Independent Automatic Feeds

Globe Dynamic Balancing Machine

An accurate but inexpensive balancer has been developed by the Globe Tool & Engineering Co., 438 Davis Ave., Dayton 3, Ohio, to supplement its line of super-sensitive dynamic balancing machines for production plants. This new machine is especially designed for use in repair shops and maintenance organizations that do not have sufficient balancing work to justify the purchase of an elaborate balancer.

Parts in a wide range of weights and sizes can be accommodated in this balancer, which has a maximum capacity for handling members weighing up to 300 pounds and 20 inches in diameter. It is claimed that parts can be balanced to such accuracy that the remaining vibration is less than 0.0002 inch. 56

"Carblox" Cemented-Carbide Gage-Blocks

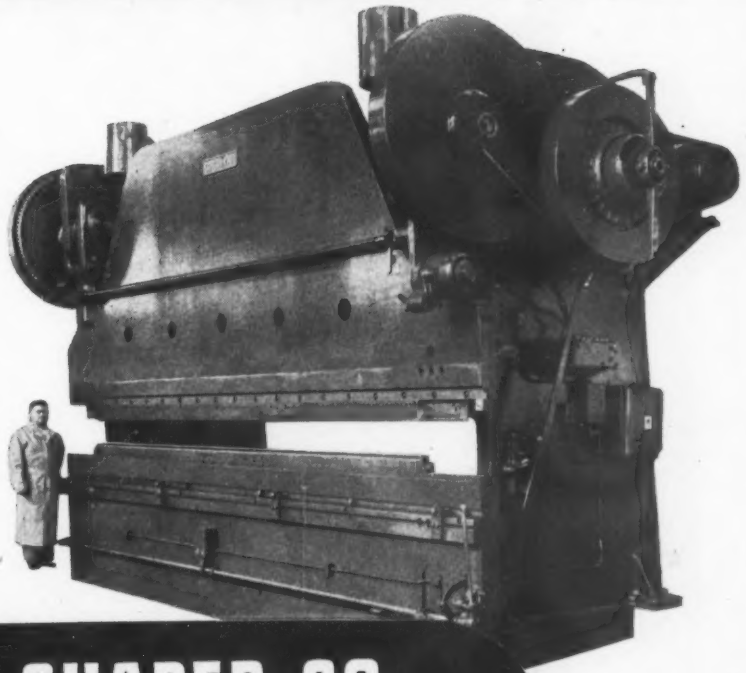
Lincoln Park Industries, Inc., 1723 Ferris Ave., Lincoln Park 25, Mich., has announced the addition of "Carblox" cemented-carbide gage-blocks to their line of gages and precision tools. These new gage-blocks are of the square type with a hole through the center. They can be used as "wear" blocks at the ends of a regular stack of built-up gage-blocks to reduce the wear on the regular blocks and to supplement and increase the useful, accurate life of gage-block sets by serving as protective anvils for the less wear-resistant steel blocks. They can, of course, be used as individual blocks.

Carblox gage-blocks are practically non-magnetic and highly resistant to rust and corrosion. Their square form allows them to

To obtain additional information on equipment described on this page, see lower part of page 198.

Stiffeners for Navy pontoons are formed rapidly and of equal importance accurately —3 bends in one hit. Removable angle brackets on the bed and ram give the wide die surface required for this type of job. This is just another example of the wide versatility of Cincinnati Press Brakes.

Consult our Engineering Department on your job or write for Catalog B-2, showing many applications of Cincinnati Press Brakes.



THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

be handled easily, provides large symmetrical working surfaces, and reduces wear by eliminating the tendency to always wring the gage-blocks together in one direction. The blocks are 0.950 inch square with 0.260-inch holes, and are available in either "A" accuracy (0.000004 inch) or "B" accuracy (0.000008 inch) in sets of two 0.050- or 0.100-inch blocks; in sets of four blocks; and in sets of fourteen varied sizes. The set of fourteen sizes, supplemented by the standard eighty-one piece set of gage-blocks, provides for building or stacking up blocks to cover any desired range. 57

High-Speed Automatic Nut Tapping Machine

The Bodine Corporation, 317 Mountain Grove St., Bridgeport, Conn., has developed a fully automatic self-contained nut tapping machine which delivers four blank nuts simultaneously to four tapping stations by means of two hopper feeding mechanisms, each equipped with two adjustable chutes. This machine will tap any nut blank that can be fed by hopper in sizes up to 1/2 inch in mild steel or its equivalent.

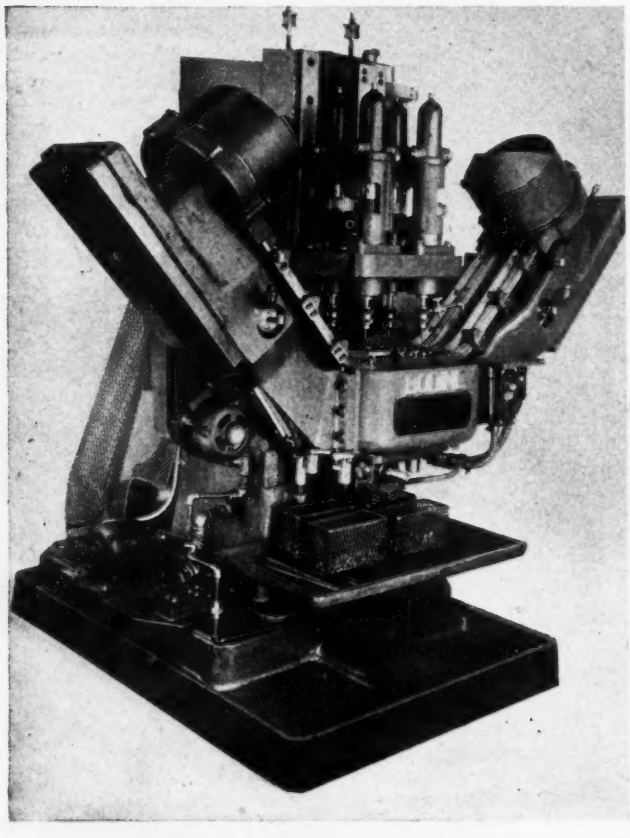
An outstanding feature of this machine, which is known as the No. 48, is the lead-screw precision control of all four spindles, which are operated simultaneously by one segmental gear drive which starts the taps at a slow speed and reverses and drives them at double the tapping speed. The threads on the master screw and its spring-tensioned nut match those of the tap, and are changed when the machine is set up for tapping threads of a different pitch.

Four precision-tapped nuts are produced per stroke, each nut being discharged into its individual collecting box, so that the product of each spindle can be gaged separately. Two sizes of nuts can be tapped at one time, each hopper delivering two blanks of each size. Safety interlocks prevent starting any of the motors out of step with the operating cycle and insure that the blanks are in their correct positions before the taps enter the work. If "commercial threads" (Classes 1 and 2) are to be tapped, the lead control spindles are not required. If desired, the manufacturer will convert the spindles to the spring-compensated type.

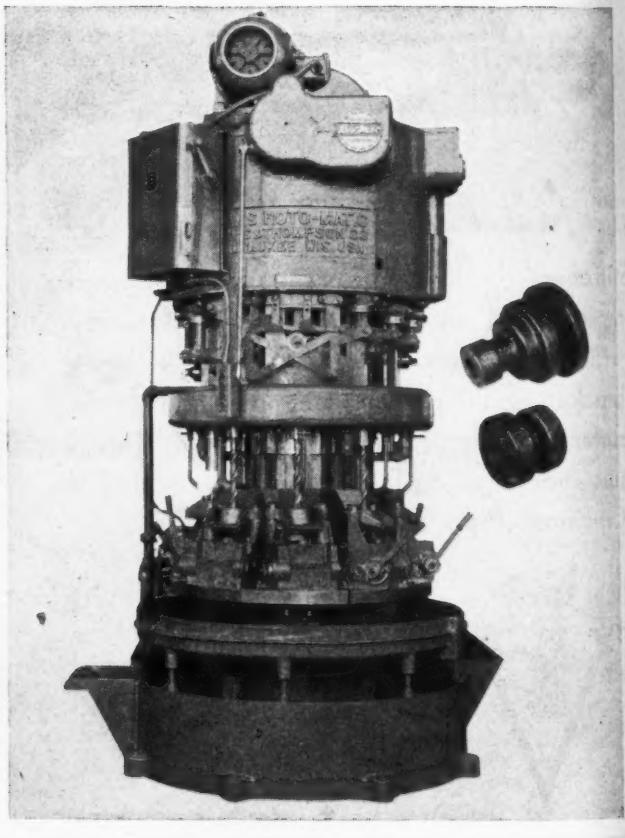
Production is dependent upon the tap size, number of threads per inch, nut thickness, material, cutting speed, coolant, etc. The maximum recommended speed is 45 strokes per minute, which gives a production rate of 9000 precision tapped nuts per hour. 58

Vertical "Roto-Matic" Driller

A recent development in the line of vertical "Roto-Matic" drillers built by the Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis., consists essentially of a basic 36-inch work-circle, twelve-spindle machine transformed into an eight-spindle driller, as shown in the illustration. This machine retains the same power and work capacity as the twelve-spindle machine. The fixtures are designed to take a cluster gear which requires the drilling of a

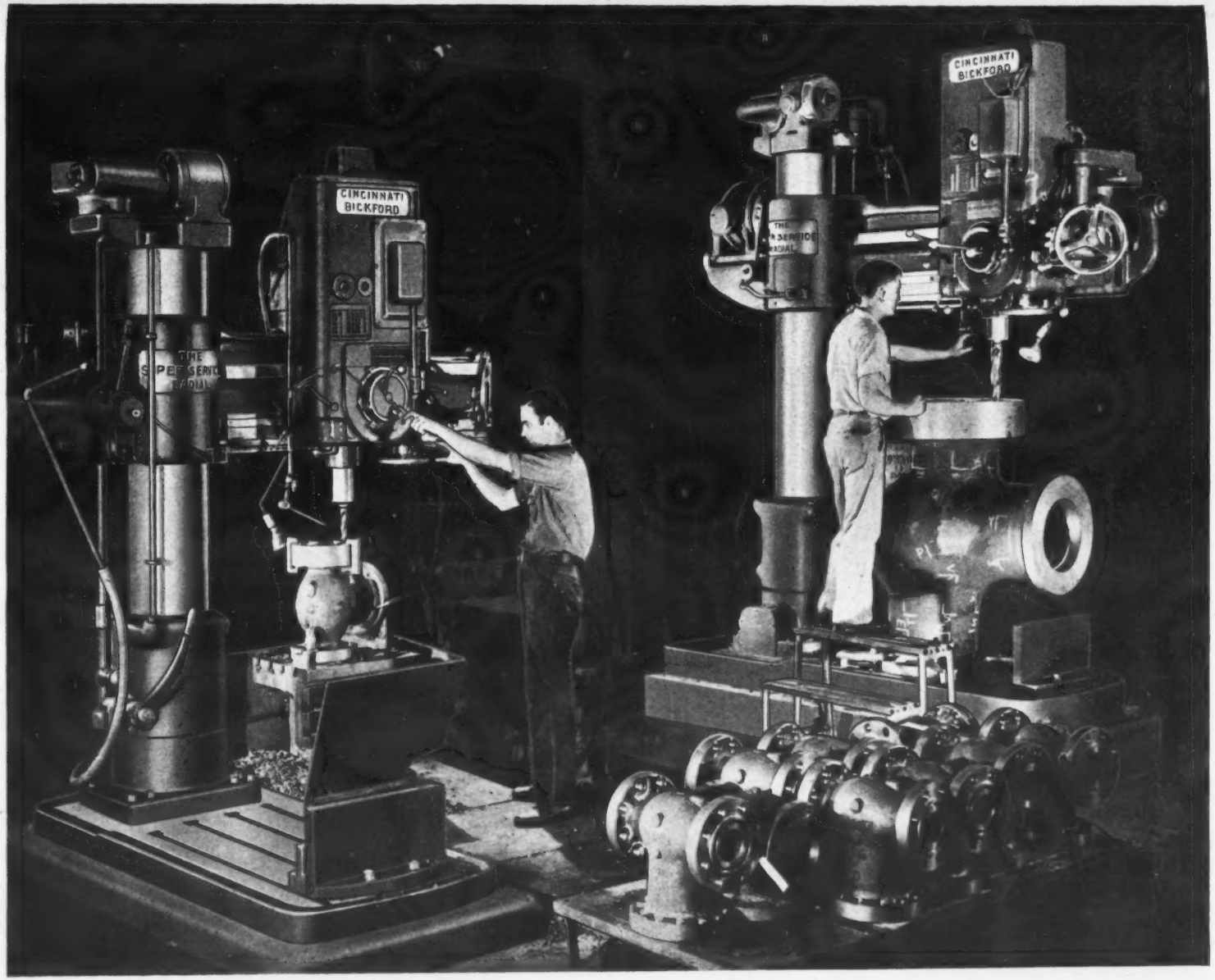


Bodine High-speed Nut Tapping Machine



Davis & Thompson "Roto-Matic" Driller

To obtain additional information on equipment described on this page, see lower part of page 198.



"Productive" IS THE WORD FOR SUPER SERVICE RADIALS

They're "going to town" on war jobs in plants, arsenals, shipyards all over the nation—witness this battery of Super Service Radials at The Edward Valve & Mfg. Co., Inc., in East Chicago, Ind. *Left*, operator is drilling the end flanges of a 4" valve for 900 lb. service at 750° F. *Right*, drilling bolt holes on the bonnet flange of the body casting of a 14" valve which will go into service at 1500 lb. and 950° F.

For greatest production per dollar in wartime and peacetime, make your next radial drill a Super Service Radial—and you'll have a tool that is fast, accurate, safe in operation, powerful and rigid, easy to handle, versatile in application, and built to last! Write for detailed bulletin.

ARMY (E) NAVY

THE CINCINNATI BICKFORD TOOL COMPANY, Oakley, Cincinnati 9, Ohio

1 35/64-inch hole to a depth of 4 inches, but they are so constructed that when the present production program is completed, they can be adapted to a larger cluster gear which requires the drilling of a larger hole to a depth of 7 inches. The machine is provided with speed and feed change-gears to meet present-day requirements.

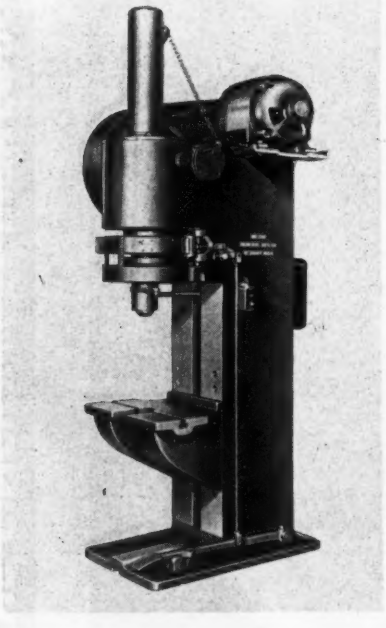
The Roto-Matic principle of continuous operation makes possible a production of 126 pieces per hour. The machine is of the non-indexing type, all that is required of the operator being to place the rough pieces in the fixtures and depress the clamping control. Finished pieces are removed after the machine has made one rotational movement. The feed of the spindles and the travel movements of the machine are entirely automatic. 59

Flexible Power Press for Straightening, Bending, and Pressing Operations

A semi-automatic power-driven machine designed for all kinds of straightening and bending operations, assembling gears and roller bearings on shafts, pressing in bushings, push-broaching, and a wide variety of press work has been brought out by the General Mfg. Co., 6436 Farnsworth Ave., Detroit 11, Mich. The pressure applied by this machine is always under the instantaneous control of the operator and is in direct ratio to the force he exerts on the pedal. The press has a rated capacity of 30 tons, and will exert a steady pressure of 20 tons and momentary pressures of 35 tons.

The drive-shaft is mounted on ball bearings, and an auxiliary return brake is employed to prevent mechanical shock when the ram is returned at a rapid rate after completing the power stroke. The opening and table height can be changed by simply removing six screws and resetting the table in locating holes drilled in the column at 3-inch intervals. The distance between the ram nose and the floor is 48 inches, and the height of the table from the floor is 30 inches; thus the standard opening of the press between the ram nose and the table surface is 18 inches.

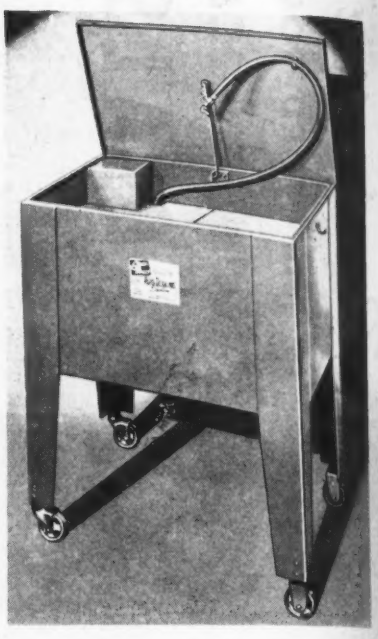
The stroke of the ram is adjustable up to 12 inches on the regular machine, but machines can be furnished with 15-, 18- or 21-inch strokes. The recommended travel speed of the ram is 120 inches per minute. The table is 24 inches wide; the distance from the center of the ram to the front of the column is 12 inches; and the distance from the front of the table to the front of the column 18 inches. The base is 24 by 40 inches, and the height of the machine is 108 inches. A 10-H.P., 1200-R.P.M. or slower speed motor is required for the drive. The weight of the machine, including the motor drive, is 4165 pounds. 60



Straightening and Bending Press Made by General Mfg. Co.

Gray-Mills Parts Cleaning System

A new parts cleaning system combining the utility of two washers in one self-contained portable unit has been brought out by the Gray-Mills Co., 1948 Ridge Ave., Evanston, Ill. The system includes a portable cleaner with a unique "swisher" feature and the use of cold-cleaning "Flo-Bac" solvent. Large parts requiring individual handling can be cleaned by a strong stream of solvent pumped from a tank. The smaller parts can be washed in quantity lots by merely pouring them into a basket and immersing them in the solvent.



Parts Cleaning Equipment Made by Gray-Mills Co.

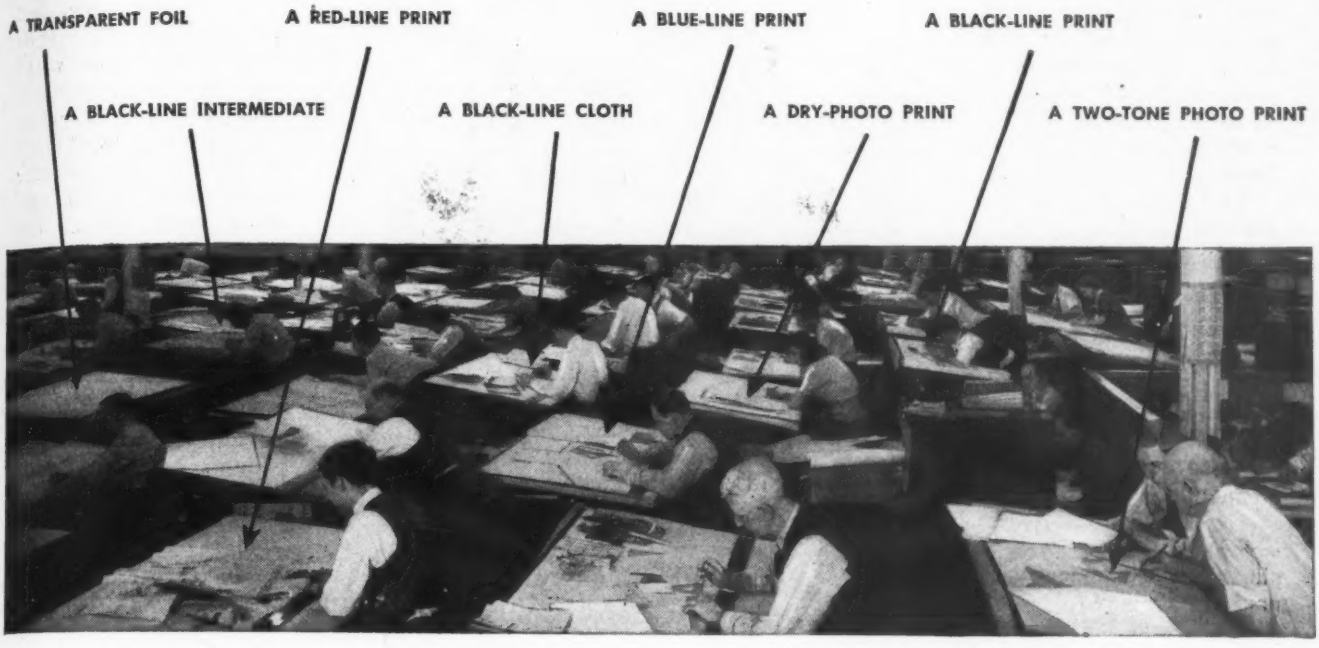
A two-section shelf can be removed to give access to the dipping tank below. The dipping basket rests on a simple hand-operated "swisher" device, which speeds up the cleaning operation by providing efficient agitation of the fluid. Parts such as castings, gears, bearings, carburetors, air cleaners, machine products, and tools can be washed quickly. The cleaning unit is fully portable, and is equipped with a built-in gear type pump. A safety cover eliminates fire hazards. The "Flo-Bac" solvent used cold, is continuously filtered, and is claimed to degrease parts without pitting and corroding. The cleaner is available in two models—the P70 shown in the illustration, and a smaller model designated the P60. 61

Improved Electrode for Light-Gage Metal Welding

An Airco No. 90-A electrode, which is an improved type of the smaller sizes of Airco No. 90 electrodes has just been introduced to the trade by Air Reduction, 60 E. 42nd St., New York 17, N. Y. This electrode is especially designed for welding light-gage chromium-molybdenum and similar steels used in aircraft welding. It has a new

To obtain additional information on equipment described on this page, see lower part of page 198.

IMPOSSIBLE requests from the drafting room?



Not when you have an OZALID whiteprint machine!

Such varied requests from your drafting room can throw you for a loss if you rely solely upon blueprint or semi-moist machines . . . because "wet" development strictly limits your choice.

But with an Ozalid Whiteprint machine, which prints *and* dry-develops, or an Ozalid Dry-developer which you can use with your present printer . . . you can fill those miscellaneous demands as fast as they come.

This is made possible because Ozalid eliminates chemical baths and driers . . . and allows use of a really amazing variety of sensitized materials which react ONLY to the unique "dry" process.

SEE these prints yourself. Learn how quickly you can produce them, how you can save by using them in ALL departments.

ARMY E NAVY

OZALID PRODUCTS DIVISION

GENERAL ANILINE & FILM CORPORATION, JOHNSON CITY, NEW YORK

OZALID IN CANADA—HUGHES-OWENS CO., LTD., MONTREAL

WRITE for free booklet of Ozalid Whiteprints and catalog, TODAY.

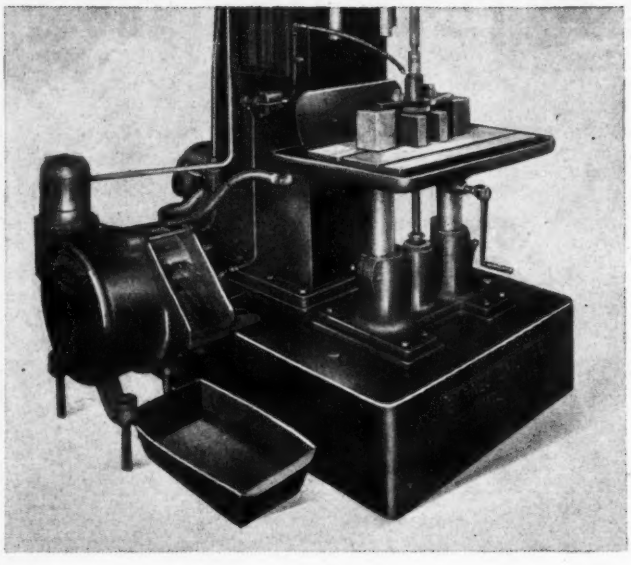
coating that provides smoother arc operation, and has the following advantages: Better appearance of deposits; stronger arc action; reduced slag interference; and excellent operation at high currents without deterioration of coating at the stub end.

This electrode is available in all three of the sizes used for light-gage welding—namely, 1/16-, 5/64- and 3/32-inch diameters. It can be used with equal efficiency for both alternating- and direct-current operation, and straight or reversed polarity. Test specimens welded on SAE 4130 steel with this electrode showed transverse tensile strengths of 80,000 to 90,000 pounds per square inch. The electrode meets the requirements of U. S. Army Air Corps Specification 10286-B, Type 1, Grade 2E, and conforms to A.W.S. and A.S.T.M. specifications for Classification E 6013. 62

Automatic Tube Reaming and Burring Machine

A combination automatic reaming and burring profiler with a capacity for handling tubes up to 6 inches outside diameter and in lengths from 3 to 60 feet or more is announced by the Pines Engineering Co., Aurora, Ill. The head assemblies, consisting of the spindles and chucks, are mounted on heavy cars suspended on flanged wheels which are anchored to the channel-iron track. One car can be moved into position for processing any length of tube desired. Tubes are fed to and from the profiler by means of an automatic reel feeding mechanism which selects tubes from storage rails, regardless of diameter. The indexing mechanism, automatic self-centering type chucks, and the spindle advance are hydraulically actuated.

A production of 200 to 400 tubes per hour can be obtained on end-facing and burring operations. The same type profiler is also used for threading, flaring, burring, turning, boring, and chamfering pipe and tubing. 63



Barnesdril Magnetic Coolant Separator Applied to Honing Machine

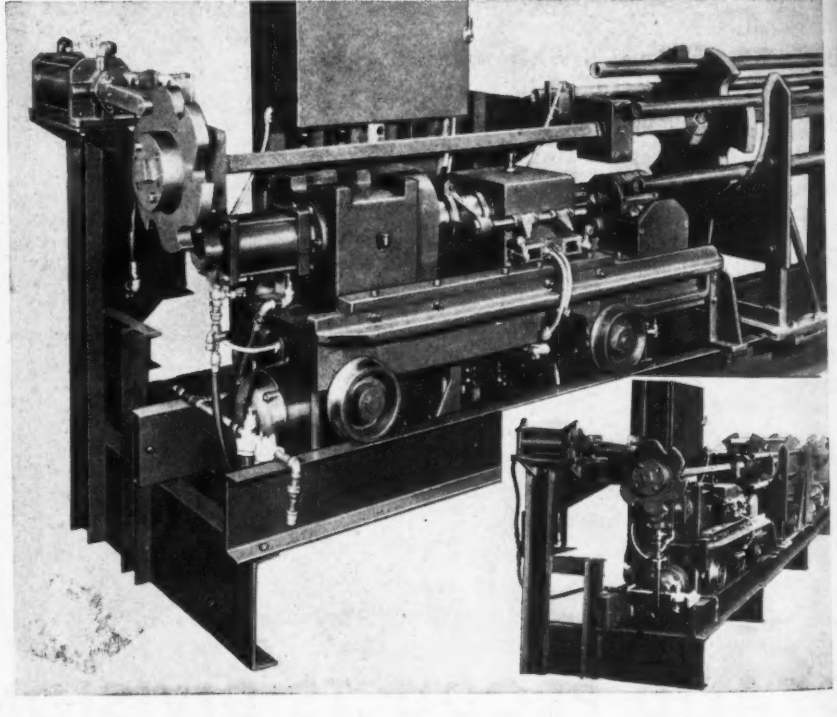
Barnesdril Magnetic Coolant Separators

A self-contained motor-driven automatic magnetic separator for coolants, designed in two standard sizes for use with honing machines of both the vertical and horizontal types in which various mixtures of kerosene and other coolants are used, has been brought out by the Barnes Drill Co., 814 Chestnut St., Rockford, Ill. All magnetic swarf and most of the suspended abrasive particles are attracted to the rotating magnetic drum of this separator and automatically discharged into a receptacle without requiring any attention from the operator. The cleaned coolant flows by gravity through the lower spout into the original reservoir in the machine base. The coolant thus cleaned is constantly pumped to the work being honed. This equipment has also proved efficient when applied to cylindrical grinding machines in which a soluble solution (soap water) is used as a coolant.

The magnetic separator is available in two sizes, each driven by a 1/4-H.P. motor having a speed of 1750 R.P.M. The larger separator weighs 600 pounds. 64

Miniature Machine Screws

The range of sizes of machine screws made by Manufacturers Screw Products, 216-222 W. Hubbard St., Chicago 10, Ill., and known as "Perfection in Minia-



Pines Automatic Tube Reaming and Burring Machine

To obtain additional information on equipment described on this page, see lower part of page 198.

CONTINENTAL OXIDATION

(48 Hours at 341° F.—Iron Wire Catalyst—Air Rate 10 liters per hour)

	Oil "A"	Oil "B"	Oil "C"	HYDRO-DRIVE MIH-20
Original Viscosity @ 210° F.	49.9	50.3	51.6	56.3
Final Viscosity @ 210° F.	58.4	57.9	59.4	63.9
* % Increase in Viscosity	17.0	15.0	15.1	13.5
Final Carbon Residue	1.58	1.71	1.95	1.83
Final Neutralization No. (Acid)	1.35	1.4	1.52	0.8
**Naphtha Insolubles:				
Hours for 10 mgs.	32	14.5	15.6	48+
Hours for 100 mgs.	48+	48+	42	48+
Final Insolubles—mgs.	41	61.9	135	7.0
Transparency:				
Original	200	200	200	200
Final	110	130	90	160

** This line denotes comparative rate of thickening of oil in service.*

*** This value indicates expected sludge and gum formations in actual service in a hydraulic system.*

TESTS POINT OUT WHY

EXCELS AS A HYDRAULIC OIL

Test results, obtained from an outside source interested in evaluating hydraulic oils, bear out our claims for the superiority of Houghton's Hydro-Drive Series.

The Continental Oxidation accelerated test was run on three competitive hydraulic oils, against Hydro-Drive MIH-20. Those three are regarded as good oils, recommended by their makers for hydraulic use.

This test subjects each oil to 48 hours' exposure at 341° F. It uses an iron wire catalyst and bubbles air through the oil at the rate of 10 liters an hour. Thus it provides a stepped-up condition similar to that in a hydraulic system where air and metal are present.

Examine the test figures on this page. They're important. They prove the merits set forth for Hydro-Drive — treated to hold gums and resins in solution, provide stability and high Viscosity Index.

Note that there was less increase in viscosity as compared to the other oils, proving that Hydro-Drive has a higher Viscosity Index.

Note also that only 7 mg. of naphtha insolubles were measured for Hydro-Drive after 48 hours' test, compared to 41, 61.9 and 135 for Oils "A", "B" and "C" respectively.

Both by test and by actual plant run, Hydro-Drive wins. Try it and be convinced. Write for full information.

E. F. HOUGHTON & CO.

303 WEST LEHIGH AVENUE, PHILADELPHIA 33, PA.

Sales and Service in all Principal Cities

ture," has been increased to include sizes 0-80, 1-64, and 1-72 thread diameters, both in steel and brass. Actually, these screws are so small that they could be used in watch manufacture. They are intended for precision equipment, such as head phones, microphones, hearing aids, and other delicate instruments. 65

Bench Type Belt Grinder

The Porter-Cable Machine Co., Syracuse 8, N. Y., has added a Model BBS bench type machine to its line of abrasive belt grinders. This new unit uses an endless metal-cutting abrasive belt, 2 1/2 inches wide by 60 inches long, which is driven at a speed of 4500 surface feet per minute by a 1-H.P. motor, and is especially suited for burring gears, grinding welds, generating radii, removing flash, cleaning up, and polishing.

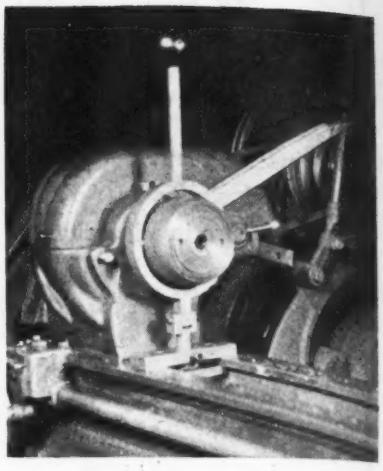
This grinder has a flat-bed grinding area of 2 1/2 inches by 8 inches, as well as a soft resilient contact wheel 7 inches in diameter by 2 1/2 inches wide, which is adapted for grinding all types of metal. Wheels 6 to 8 inches in diameter can be used on the 1-inch arbor. The complete unit is ruggedly constructed to operate without vibration. 66

Otsego Speed Chuck with Expanding Arbor

The speed chuck illustrated has been developed to replace the chuck previously made by Otsego Products, 9214 Otsego Ave., Detroit, Mich. The manufacturing and sales rights for the new Otsego chuck have been acquired by the Morrison Holmes Co., 414 Curtis Bldg., Detroit 2, Mich. An expanding arbor has been developed by the latter company, which quickly converts the chuck for holding work on the inside diameter. This arbor can be operated while the machine spindle is in motion.

The chuck is of the cam action type, designed to eliminate friction and increase accuracy with respect to concentricity and working tolerances. It is made in two sizes—the Junior Model and the Senior Model. The Junior Model has a collet range of from 1/8 to 7/8 inch and an expanding arbor range of from 1/2 to 2 1/2 inches. The Senior Model has a collet range of from 7/8 to 2 inches and an expanding arbor range of 1 to 4 1/2 inches.

The controls of this machine are so designed that a quick forward or backward movement of the lever instantly engages or disengages the stock to allow safe removal or insertion of work. The extra strong collets provide a permanent, positively locked grip on the work. Concentricity and smoother finish of the work result from careful grinding and precision fitting of the chuck parts. Maintenance costs are low, as there are only two moving parts and no parts that require lubrication. The chuck can be used on any speed or polishing lathe having a 1 1/2-inch spindle with eight threads per inch. 67



Otsego Speed Chuck Now being Built by Morrison Holmes Co.

Jansson Carbide Thread Gages

A complete line of carbide thread plug gages has just been announced to the trade by the Jansson Gage Co., 19208 Glendale Ave., Detroit 23, Mich. It is claimed that the extreme care taken in grinding these gages insures exceptionally close tolerances. The wear-resisting properties of carbide are employed to insure continued accuracy of the gages over longer periods of time and to permit more gaging operations before checking or refinishing of the gages becomes necessary.

Three styles of carbide thread plug gages, made according to American Gage Design Standards, are available. Solid carbide is used for the smaller size gaging members, while the larger sizes have a carbide bushing over a steel body. All gaging members, however, are ground from solid carbide. A complete range of sizes is available from 0.112 inch to 3 inches, with the gages accurately ground to Class X or Class Y tolerances. Gages for National American Form threads can also be supplied. 68

Bench Type Belt Grinder Brought out by Porter-Cable Machine Co.

To obtain additional information on equipment described on this page, see lower part of page 198.

Hydraulic "Speedpress" Made by Studebaker Machine Co.

Optical Projector Made by the Portman Optical Co.

Studebaker Hydraulic "Speedpress" Designed for Easy Operation

An entirely new air-hydraulic, gap type "Speedpress" is being placed on the market by the Studebaker Machine Co., 1221 S. 9th St., Maywood, Ill. This new press, named the "Corsair," will exert a maximum pressure of 1 3/4 tons. By simply pressing down on the hand or foot control, the ram of the press can be caused to travel quickly any predetermined distance from 1/32 inch to 2 1/2 inches and deliver the required pre-selected pressure. When the control is released, the ram is automatically retracted.

Air cylinder and hydraulic pump units, built into the body of the press, are easily accessible and removable for servicing. The press can be operated at maximum speed or the ram can be slowed down to suit any requirement. Tough materials can be given rapid repeated blows, and fragile materials can be subjected to a squeezing action to prevent shattering. The machine is especially adapted for operations such as stamping, riveting, assembling, forming, and cutting. 69

Portman Bench Model Optical Projector

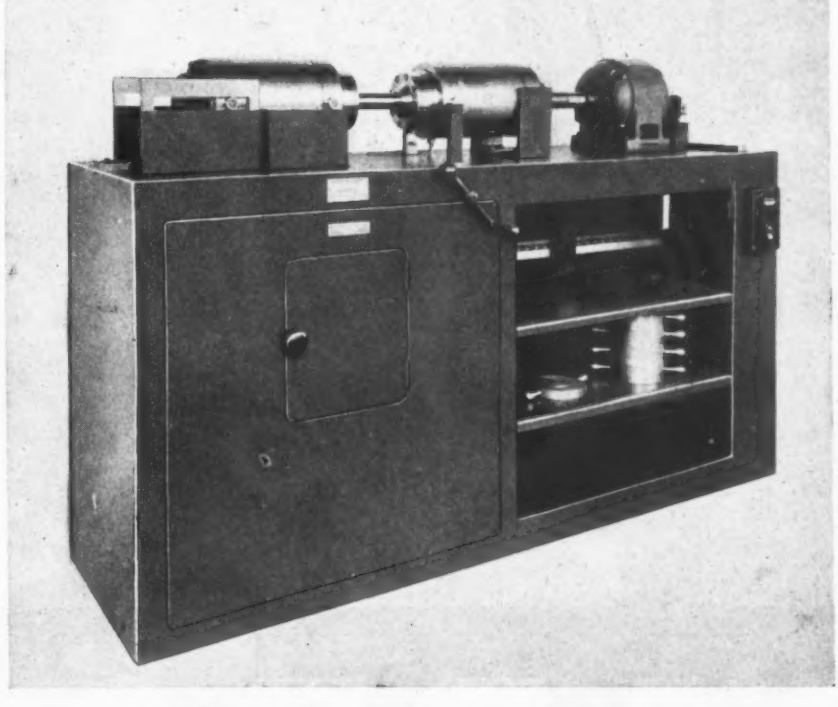
The Portman Optical Co., 70 Mill Road, New Rochelle, N. Y., has recently placed on the market a bench type optical projector of simplified design and rugged construction. The exceptionally fine optical lens system of this projector, combined with the scientifically correct light source equipment, provides excellent image definition at all magnifications.

This projector is especially adapted for use by unskilled operators on any type of inspection work suitable for checking by the optical projection method. Inspecting work on a production rate schedule is made possible by using comparatively simple staging V-blocks or other inexpensive work-holding fixtures, such as are generally available in inspection departments.

This Model P2.5 optical projector has a large working capacity, and is furnished with a standard full-size 14 1/2-inch diameter working screen. The stage of the projector is 4 by 4 inches. The projector is 42 inches long, 18 inches wide, 32 inches high, and weighs approximately 200 pounds. It can be furnished with a 10X, 25X, 50X, or 90X magnification lens unit, and can be operated on any ordinary lighting circuit of 110 volts.....70

Rotating-Beam Fatigue Testing Machine

The Baldwin-Southwark Division, Baldwin Locomotive Works, Philadelphia, Pa., has placed on the market a new over-size rotating-beam fatigue testing machine, designed to test materials in accordance with methods based on reports of experimental work which indicate that specimens of 1-inch minimum diameter eliminate "size effect" in fatigue testing. This new Model SF-10R machine has a testing capacity of from 0 to 10,000 inch-pounds, adjustable by units of 5 inch-pounds bending moment through the positioning of a weight on a beam. Provision is also made for adjusting the machine to take specimens ranging in length from 3 1/2 to 9 1/2 inches. 71



Baldwin-Southwark Rotating-beam Fatigue Testing Machine

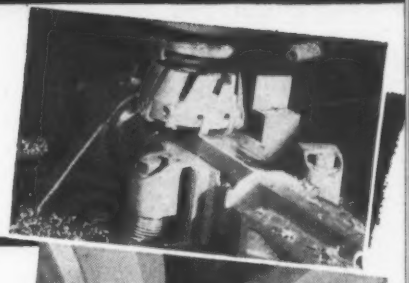
To obtain additional information on equipment described on this page, see lower part of page 198.

MADE BY MAN . . .

ARE THEY *ALL* IN YOUR POST-WAR PLANS?

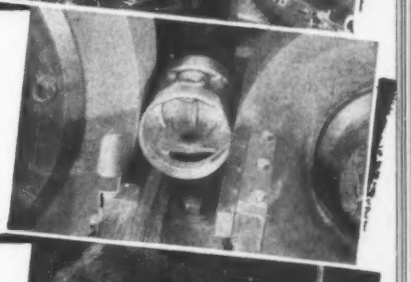
★ METAL CUTTING . . .

As a cutting tool, Carboloy Cemented Carbide slashes product cost by conserving machines, manpower, time and materials, steps up production often as much as 3:1.



★ GRINDING . . .

As matrix for diamond impregnated dressers, Carboloy Cemented Carbide reduces dresser costs, eliminates resetting expense and cuts diamond waste.



★ INSPECTION . . .

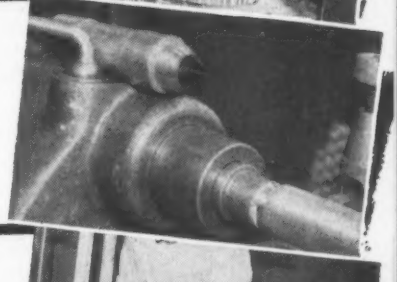
Used on the contact surfaces of all types of gages, Carboloy Cemented Carbide insures dependable accuracy; keeps gages in service as much as 100 times longer than other metals.

★ PRESS WORKING OF METALS . . .

As a die for drawing and forming metal parts, Carboloy Cemented Carbide produces parts with mirror-like finish and closer tolerances; eliminates frequent rejects; drastically cuts die cost per piece.

★ MACHINE OPERATION . . .

As a means of increasing life of machine parts—such as centers, grinder rests, cams, guides, etc.—Carboloy Cemented Carbide tipped parts eliminate costly tie-ups for replacements and repairs; keep production rolling.



★ PLANT MAINTENANCE . . .

As a masonry drill, Carboloy Cemented Carbide penetrates concrete, brick, tile, incredibly fast; permits quick installation of machinery, wiring, pipes, etc. A valuable reconversion aid.

TUNGSTEN CARBIDES ★★

TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

For Cutting CAST IRON — For Cutting STEEL

and . . .

TO "WEAR-PROOF" *The* PRODUCTS YOU SELL!

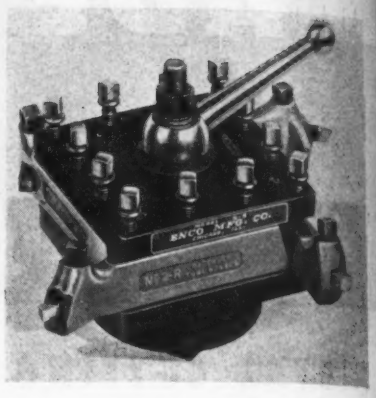
Westinghouse High-Frequency Generators

A complete line of high-frequency generators for handling both induction and dielectric heating loads of 1, 2, 5, 10, and 20 kilowatts, designed according to NEMA standards, has been brought out by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These generators are self-contained, and require only electrical connection to a 60-cycle power supply line. No external cooling or auxiliary equipment is necessary. Units of 50- to 200-kilowatt capacity can be supplied, in addition to the standard size generator.

The primary voltage is 220 or 440 volts, single phase for ratings of 5 kilowatts or lower and three phase for 10 kilowatts or higher. The oscillator, power supply, blower, and necessary switch gear are housed in a single cabinet. The high-frequency section is completely shielded to minimize the possibility of interference with communication circuits. An automatic timing control permits load cycle adjustment to predetermined time for repeat work. Terminals are provided for remote control.

Air-cooled tubes are used in the standardized generators. The air blower for cooling the tubes provides circulation of air throughout the entire equipment. The high-frequency oscillating circuit varies with the kilowatt rating and frequency needed. The circuits selected entail the least number of controls, are simple to adjust, and operate with maximum efficiency.

Single-phase, full-wave, mercury-vapor rectifiers provide the anode current for generators under the 10-kilowatt size. For capacities of 10 kilowatts and larger, a three-phase, full-wave rectifier, utilizing six mercury-vapor tubes, is used to give even distribution of power, reduce the size of the conductor, and provide better voltage regulation. Time-delay switches are standard on all rectifiers. 72



Enco Square-turret Toolpost

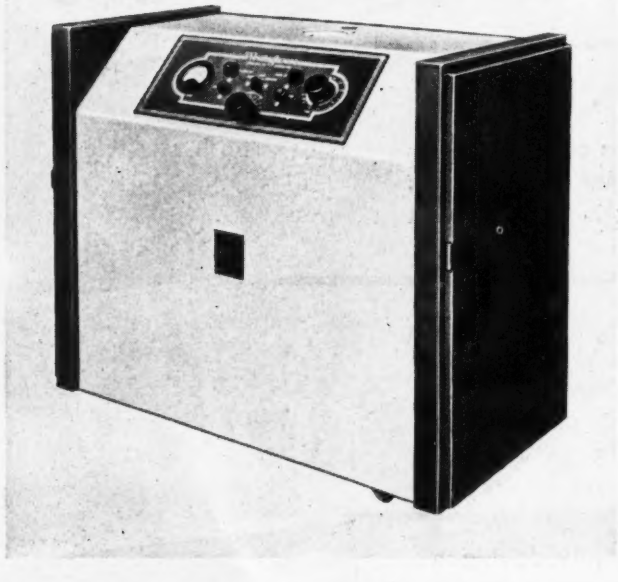
Square-Turret Toolpost

The Enco Mfg. Co., Department 65, 3321-23 Montrose Ave., Chicago 18, Ill., has brought out a 6-inch square turret toolpost for use on lathes of 16-inch swing and larger. The center post, which is nearly 5 inches in diameter, is designed to have sufficient rigidity to withsand heavy cuts taken by the larger tools at high speeds. The turret block is designed to hold tool bits in sizes up to 1 1/4 inches or No. 2 tool-holders for 3/8-inch square bits where additional flexibility in operation is required.

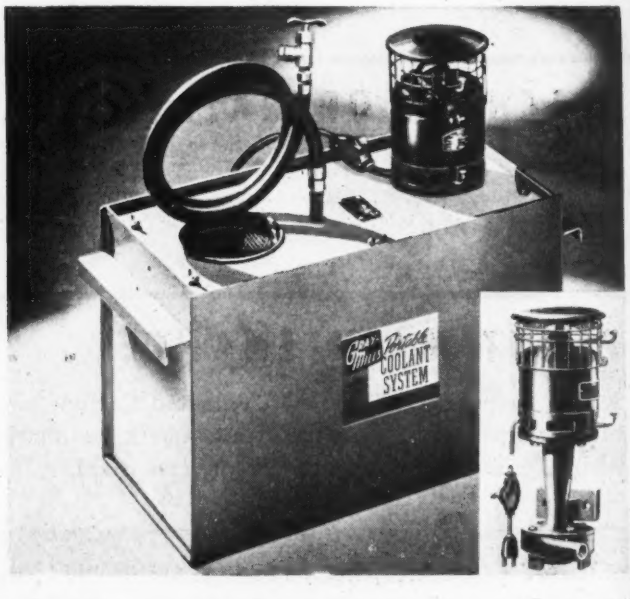
The indexing mechanism, being self-contained, eliminates all chip interference and insures maintenance of an accurate setting on production work. "Mac-it" toolpost screws are standard equipment on this model. Hardened steel construction is used throughout. The Model 6-S toolpost, however, is also available with the lower portion of the base left soft to permit machining it to suit the lathe on which it is to be used. 73

Gray-Mills Portable Coolant System

The Gray-Mills Co., 1948 Ridge Ave., Evanston, Ill., has just added to its line of coolant systems a new Model 1130 unit, consisting of a portable coolant system and centrifugal pump. This unit is particularly suited for the application of coolants to grinders, cut-off saws, milling machines and for such operations as fine abrasive cutting and honing, or wherever

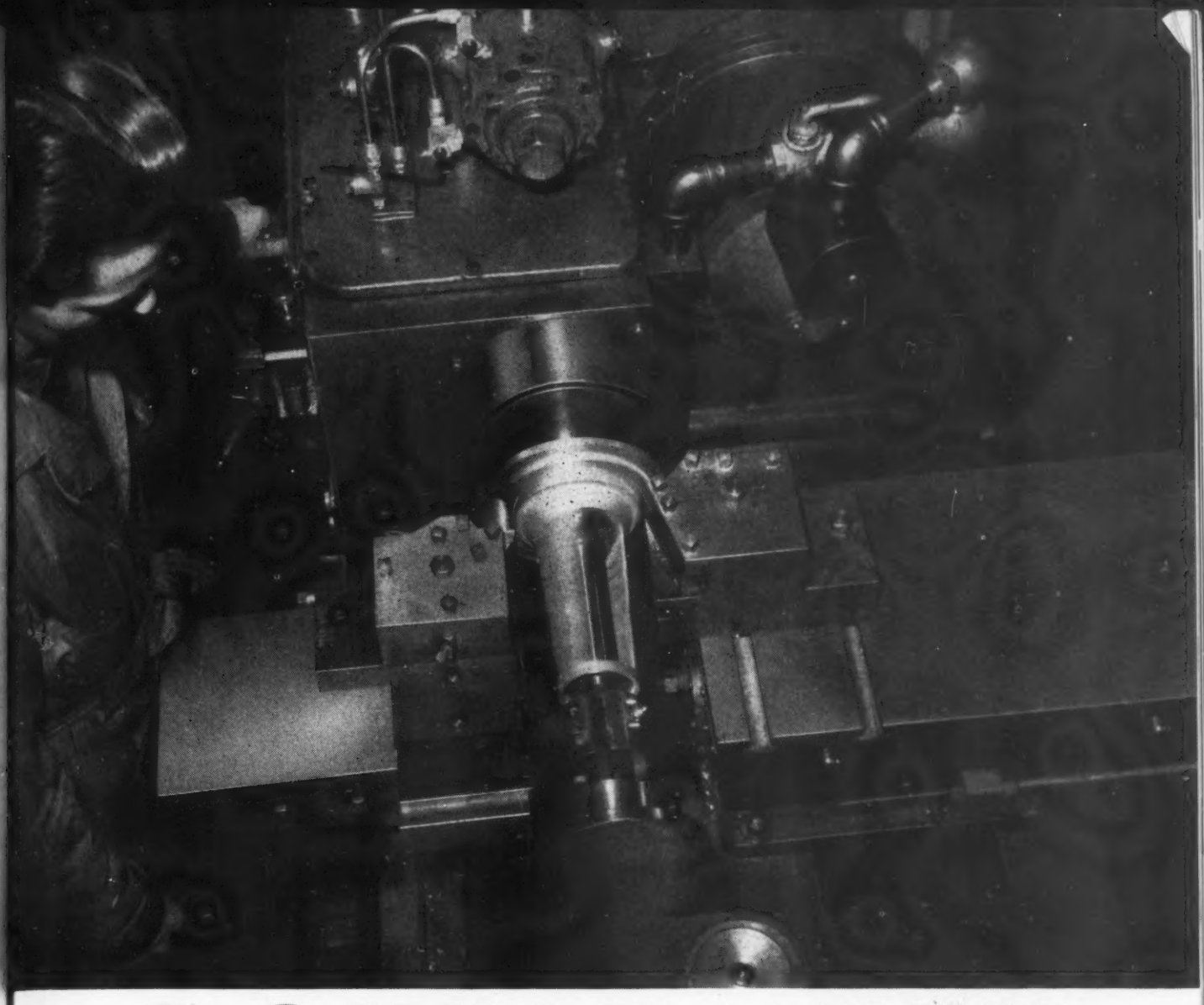


Westinghouse High-frequency Generator for Induction and Dielectric Heating



Portable Coolant System Added to Line Made by the Gray-Mills Co.

To obtain additional information on equipment described on this page, see lower part of page 198.

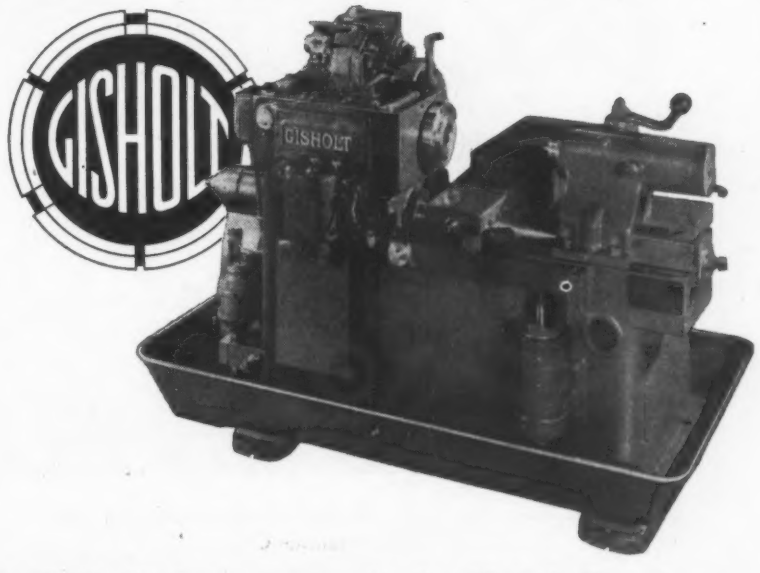


DOUBLE DUTY

WITH THE GISHOLT HYDRAULIC AUTOMATIC LATHE

ACTUALLY "double duty" is ultra-conservative for the production ability of this automatic lathe. For it can out-produce two, three, or even four manually operated machines wherever parts are to be turned out in large quantities.

What's more, its operation is so simple that one man, or woman, can tend two or three machines at a time. With but one small lever to control a whole cycle of operations, the training problem is practically eliminated. It's designed to handle a wide variety of between-centers and chucking work with high speed multiple cutting and extreme accuracy. If you can use this kind of production—to save man-power and cut costs—now and in the post-war period—ask for facts about the Gisholt Hydraulic Automatic Lathe.



GISHOLT MACHINE COMPANY
1209 East Washington Ave. • Madison 3, Wis.

Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

the larger capacity of this company's "Model 1000 Centrifugal System" is not required. The new smaller system provides a fully adjustable flow of coolant and is simple, compact and easily portable. The centrifugal pump has a capacity of 1200 gallons per minute at a zero head or 360 gallons per minute at a 5-foot head, and is driven by a 1/15 H.P. motor with sealed bearings. The pump is also designed for built-in coolant systems and as a general-purpose pump for use in sumps, etc. The mounting bracket permits either vertical or horizontal attachment, or the unit can be rested on its base. Wear is negligible, since abrasives or chips can pass through the pump without binding or abrasive action. 74

Hill Grinding Fixture for Radius Cutters

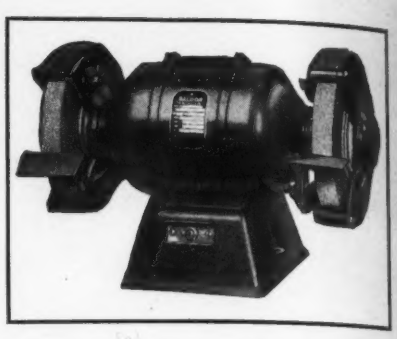
A new radius grinding fixture has been brought out by the Hill Machine Co., 1032 Mulberry St., Rockford, Ill., to meet the need for equipment adapted for sharpening large numbers of radius cutters. All the adjustments needed for making the correct settings for radius, feed, back-off angle, and arc are provided. Arcs of angles up to 180 degrees and certain angular or flat edges or surfaces can be readily ground through the use of this fixture.

As shown in the illustration, the fixture has a column which carries a horizontal spindle. At one end of the spindle is the operating handwheel with a disk and adjustable stops for limiting the arc of the swinging movement. At the other end of the spindle is the head with two micrometer-set, adjustable cross-slides, which are located at right angles to each other. These slides enable the cutter to be positioned so that the center of the tooth radius coincides with the center line of the fixture spindle. The outer slide carries an adapter plate on which the work is clamped. On the inner side of the head is a graduated scale and a locking plunger for securing the adapter in the horizontal position or in the upper or lower vertical position.

A graduated scale on the base facilitates swinging the column to the correct angle for backing off the teeth to give the required clearance angle. Finally, there is an adjustable spring stop for indexing. Two tools needed for the initial set-up are also furnished—a diamond dresser and a gage for squaring up the first tooth face to be ground. 75

Baldor Grinder

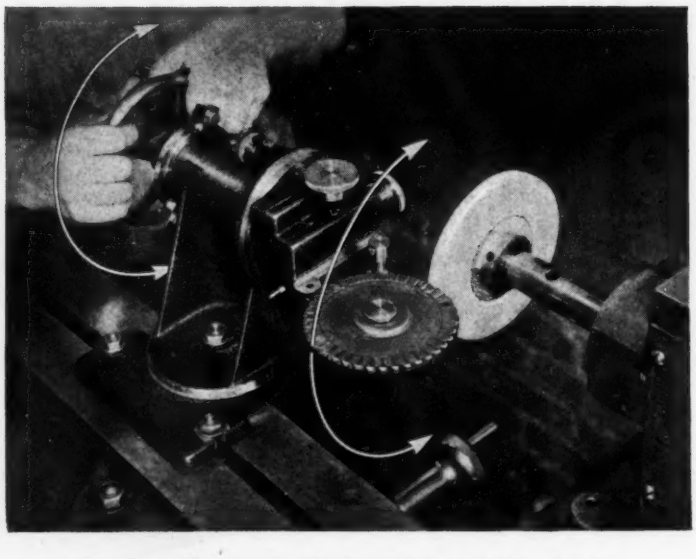
The Baldor Electric Co., 4400 Duncan Ave., St. Louis 10, Mo., has brought out a new 7100 series grinder, which has a motor especially designed for cool running when carrying a normal load and having a 100 per cent overload capacity. The motor has pre-lubricated ball bearings which require no lubricant during their entire life. The grinder is equipped with wheels 7 inches in diameter by 1 inch thick having a 5/8-inch arbor hole. These wheels are accurately balanced by means of Baldor patented flanges. The grinder is available with either a 1/4-H.P. motor operating at 1700 to 1725 R.P.M. or a 1/2-H.P. motor operating at 3400 to 3440 R.P.M. 76



Grinder Made by the Baldor Electric Co.

Dalzen Center Lapping and Drilling Machine

One simple adjustment, requiring only a few seconds, is all that is necessary to change over from center grinding to drill press operations or vice versa on the new "2-in-1" machine brought out by the Dalzen Tool & Mfg. Co., 12255 E. Eight Mile Road, Detroit 5, Mich. The change from one type of machine to the other is accomplished simply by lifting a pin and swinging the center grinder



Grinding Fixture for Radius Cutters, Made by the Hill Machine Co.

Dalzen Combination Center Lapping and Drilling Machine

To obtain additional information on equipment described on this page, see lower part of page 198.

dresser in or out of the operating position. This machine is designed to reduce equipment costs and to save floor space. It is easily portable, weighing only 165 pounds, has a height of 67 inches, and has a floor stand measuring 15 by 21 inches. The 10- by 10-inch work table has its smooth surface slotted to receive T-bolts.

The standard length between centers is 39 inches, but the equipment can be furnished in other lengths on request. The capacity of the drill press, which will drill to the center of a 13-inch circle, is 1/2 inch. The dresser is adjustable from 20 degrees to 100 degrees. The spindle rotates on two precision ball bearings, with a double bearing at the lower end to take the thrust. The machine is furnished with a 110-volt motor, V-belt drive, truing diamond, and 1 1/2-inch lapping stone. ——77

Rieger Die-Holder

A simple yet efficient die-holder, built to accommodate button dies having an outside diameter of either 1 inch or 1 1/2 inches, has been placed on the market by the Rieger Mfg. Co., Department M-9, Miamisburg, Ohio. The standard model has a No. 2 Morse taper shank. Tapers and straight shanks of other sizes are available on special order. Four large holes in the body of the tool provide space for the free ejection of chips.

The manufacturer recommends the use of this die-holder for production runs on thread-chasing work up to 5/8 inch in diameter, and in thread lengths up to 3 inches, on bench lathes, turret

Die-holder Made by the Rieger Mfg. Co.

lathes, or drill presses having reversible spindles. The tool is designed to produce true straight threads, the tough alloy-steel holders being heat-treated to provide the strength required to stand up under severe usage. The holders are furnished with a highly ground finish. —— 78

Sheffield Extended-Anvil Adjustable Snap Gage

Adjustable snap gages with extended anvils, designed to facilitate quick location of the work between the gaging points, have been brought out by the Sheffield Corporation, Dayton 1, Ohio. When used as a hand-gage, the extended anvil enables the inspection work to be done quickly and accurately, with less fatigue than with the ordinary anvil.

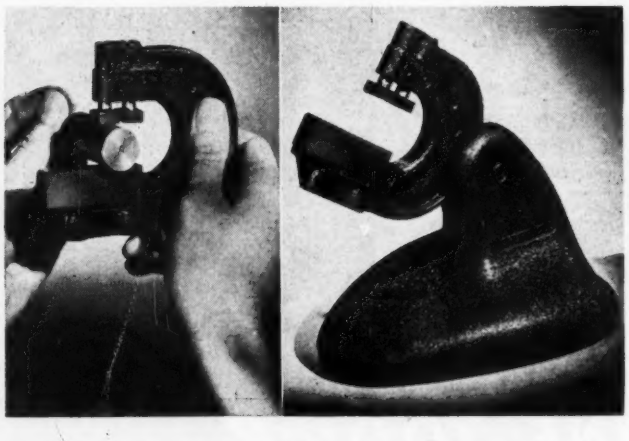
When the extended-anvil gage is used in a stand, the lower anvil provides a platform upon which the work can be quickly located and properly presented to the gage. The adjustable anvils of these snap gages are equipped with A.G.D. locking devices. Square type anvils are furnished as standard equipment, but pin type anvils can be supplied on request. Twenty-five standard models cover a gaging range of from 0 to 6.625 inches, with a choice of two different heights for the lower anvils. —79

Bellows Type Shaft Seal

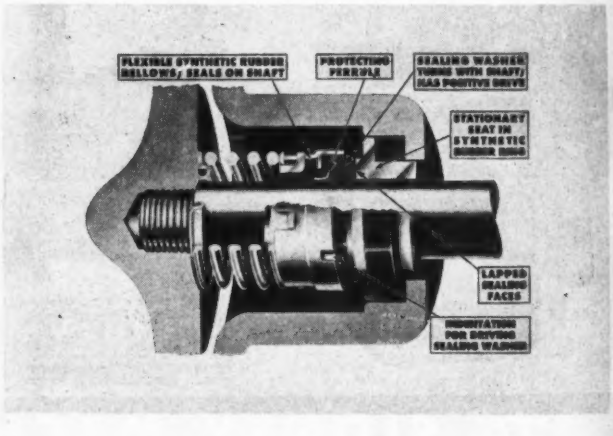
A new mechanical seal designed to eliminate stuffing-box leakage and provide perfect sealing on centrifugal pumps, refrigeration compressors, speed reducers, rotary pumps, agitator shafts, and many other rotary sealing applications has been brought out by the Crane Packing Co., 1838 Cuyler Ave., Chicago 13, Ill. This new product, known as the John Crane bellows type shaft seal, has been thoroughly tested on many exacting services, and is said to be giving excellent results under high-speed and high-pressure operating conditions. It is furnished as a complete sealing unit especially designed for easy installation.

The stationary floating seat used in most installations is held in a synthetic rubber ring, as shown in the illustration. This construction permits easy insertion, prevents stress distortion of the sealing face during installation, and allows the face to be lapped before insertion, thus eliminating the difficulties ordinarily involved in lapping faces in seal cavities.

The flexible bellows and holding ring are molded of special synthetic rubber developed for maximum



Sheffield Extended-anvil Snap Gage Shown as Used for Hand and Stand Gaging

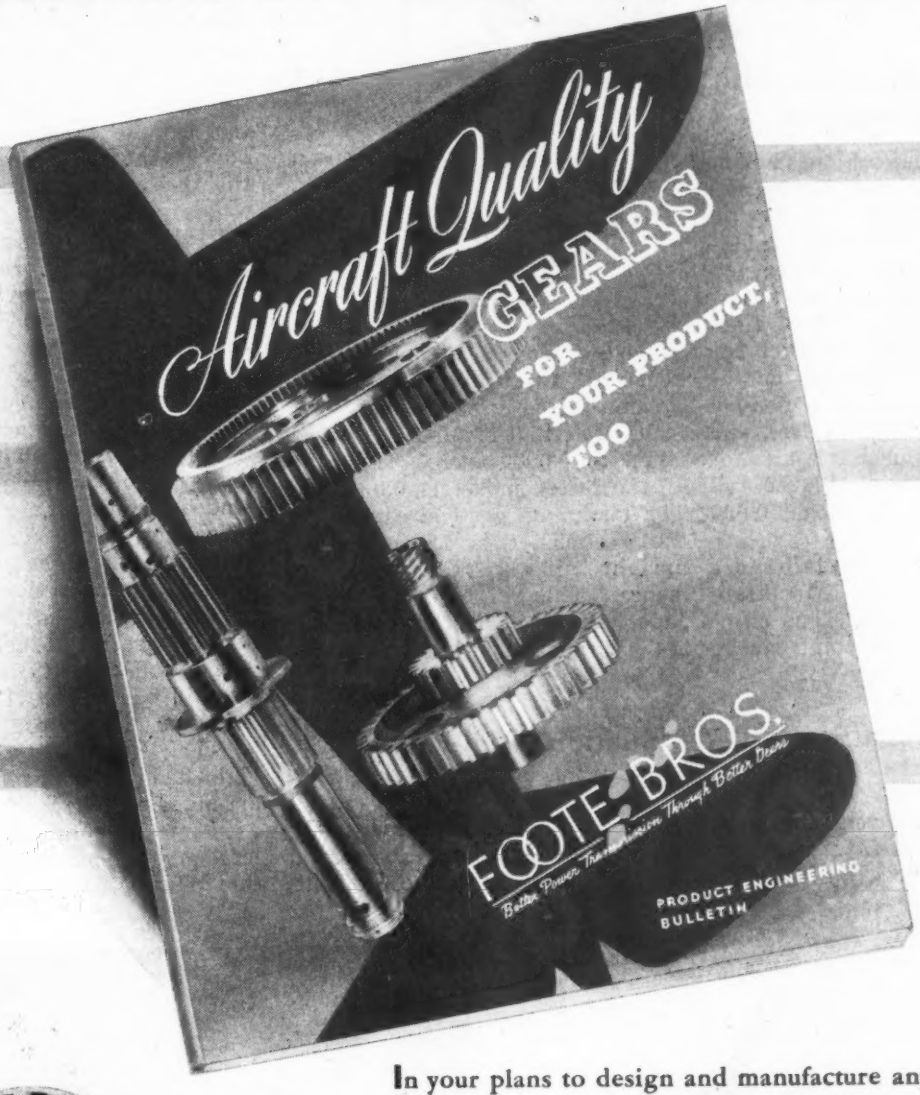


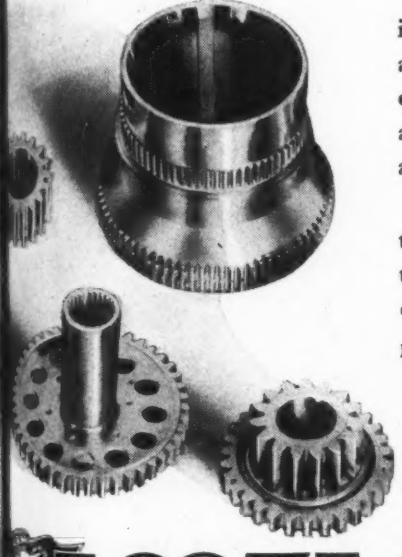
Cross-section of Shaft Seal Brought out by the Crane Packing Co.

To obtain additional information on equipment described on this page, see lower part of page 198.

Better Power Transmission

THROUGH BETTER GEARS





In your plans to design and manufacture any equipment requiring the transmission of power, "Aircraft Quality" Gears offer your engineers the advantages of greater mechanical efficiency, lighter weight, longer life, greater compactness and quieter operation. These gears are now being produced in amazing quantities to power the world's greatest air force—they will be available to you as soon as war conditions permit.

A product engineering bulletin on these revolutionary gears is in preparation and will be sent to manufacturers interested in "better power transmission through better gears" as soon as it is off the press. If you would like to receive a copy when it is ready, mail the coupon below.

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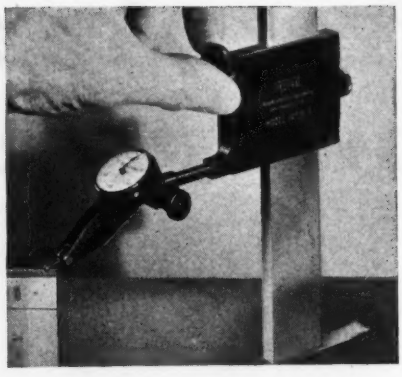
City.....*State*.....

resistance to oil, hydro-carbons, refrigerants, water, and anti-freeze solutions. Other parts of the seal are made of materials selected to give maximum service and to resist the chemical action of the fluids to be handled. 80

Federal Height Gage with Fine Adjustment

Fine adjustment of the indicator bracket of a new Testmaster height gage brought out by the Federal Products Corporation, 1144 Eddy St., Providence 1, R. I., permits bringing the indicator into the gaging position with a light sensitive contact. The bracket can be adjusted to any position on the upright blade, and has a fine-adjustment screw which raises and lowers the Testmaster indicator point a distance equal to the full range of the indicator, or 0.030 inch.

The indicator has dovetail slides and a universal clamp to facilitate setting in any position. The chromium-plated indicator point can be swiveled through an angle of 180 degrees. The dial of the Model 1 Testmaster is graduated to 0.001 inch, while that of Model 2 is graduated to 0.0001 inch. The range of the latter model is 0.008 inch. The maximum vertical capacity of the Testmaster is 18 inches, the upright being 1 1/4 by 1/4 by 20 inches. The weight of the height gage, complete with the indicator, is 3 1/2 pounds. 81



Federal Height Gage with Testmaster Indicator Mounted on Fine-adjustment Bracket

"Micro-Turnthread" Combination Tool-Holder and Steadyrest

An ingenious and versatile lathe attachment, known as the Micro-Turnthread, has been designed by Blank & Buxton Machinery Co., 3100 E. Michigan Ave., Jackson, Mich., to overcome the difficulty frequently encountered in turning or threading long small-diameter shafts. It is essentially a combination tool-holder and follow-rest which can be installed in the lathe toolpost.

Embodied in the tool-holder are rollers which are adjustable to suit variations in the diameter of the work. Micrometer adjustment is provided for the cuttting tool. The tool can be quickly moved in and out at the beginning and end of the threading cuts by means of a toggle arrangement. The quick retractable feature can be employed to advantage in forming and cutting-off work. Provision is made for changing the tools very quickly without disturbing the set-up, as required in making certain types of studs, bushings, washers, etc.

The Model A attachment, shown in Fig. 1, is available for right- or left-hand turning, and is intended primarily for turning and threading operations. It is also suitable for light forming and cutting-off operations. The follower rolls are adjustable for diameters from 1/2 inch to 2 inches. The cut-off capacity is 1 3/4 inches in solid bar stock. The tools used in this model are ground from 3/8-inch square tool bits. The right-hand attachment has the tool arranged to follow the rolls, and is used on finished shafts. In the left-hand model the tool precedes the rolls.

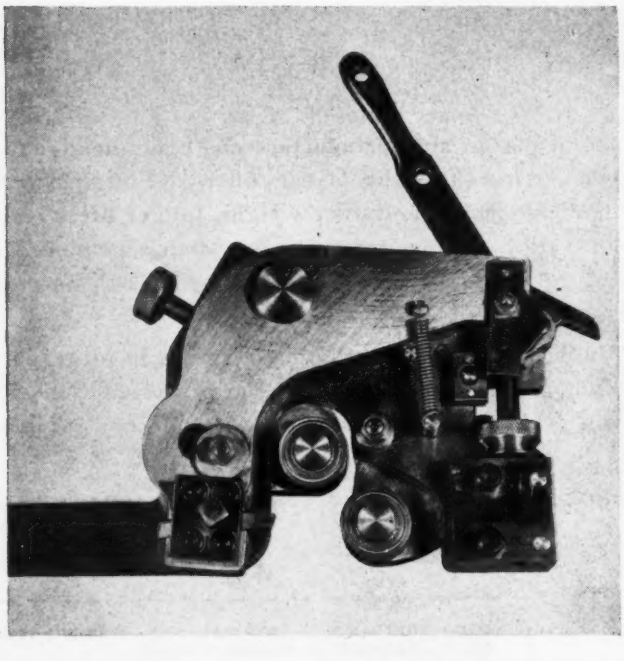


Fig. 1. Model A "Micro-Turnthread" Combination Tool-holder and Steadyrest

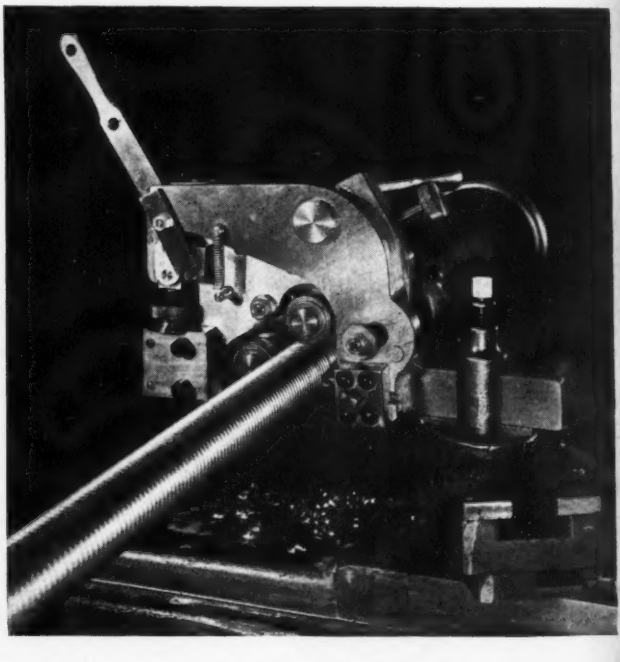


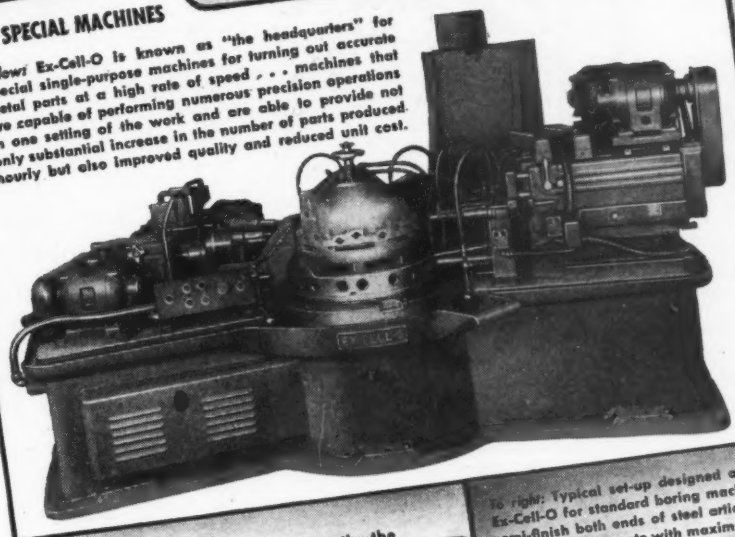
Fig. 2. "Micro-Turnthread" Tool-holder Arranged for Cutting Acme Threads

To obtain additional information on equipment described on this page, see lower part of page 198.

A File of EX-CELL-O Production Aids

SPECIAL MACHINES

Below: Ex-Cell-O is known as "the headquarters" for special single-purpose machines for turning out accurate metal parts at a high rate of speed . . . machines that are capable of performing numerous precision operations in one setting of the work and are able to provide not only substantial increase in the number of parts produced hourly but also improved quality and reduced unit cost.

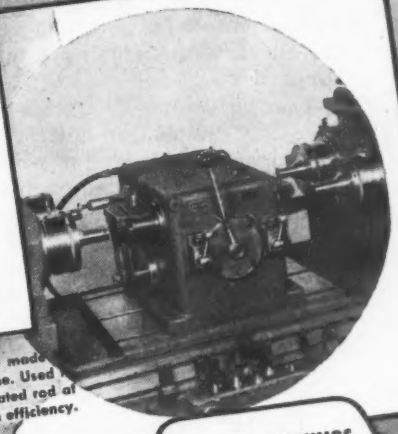


STANDARD MACHINES

Ex-Cell-O precision machine tools—for boring, turning, facing, thread grinding, broach sharpening, tool grinding, lapping—are sound in design and construction. The simplicity of their operation and the substantial production they attain on an economical basis, make these Ex-Cell-O standard machines of practical interest to both the manufacturers who install them and to the men who operate them.

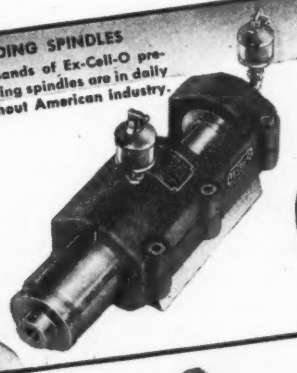
FIXTURES

To right: Typical set-up designed and made by Ex-Cell-O for standard boring machine. Used to semi-finish both ends of steel articulated rod at a high production rate with maximum efficiency.



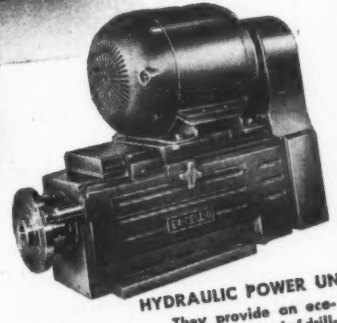
GRINDING SPINDLES

Many thousands of Ex-Cell-O precision grinding spindles are in daily use throughout American industry.



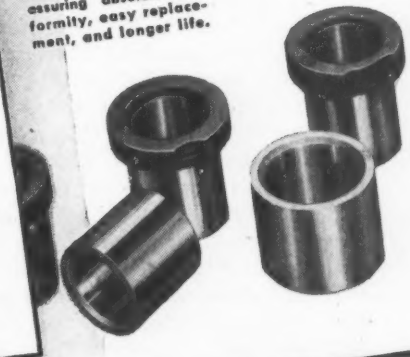
HYDRAULIC POWER UNITS

They provide an economical method of drilling, reaming, countersinking or spot-facing. Also may be used as prime movers or drivers for other machine units.



DRILL JIG BUSHINGS

Ex-Cell-O drill jig bushings (A.S.A. Standards) are made with accuracy, assuring absolute uniformity, easy replacement, and longer life.



CONTINENTAL STANDARD and SPECIAL CUTTING TOOLS (High Speed and Carbide)

IN your production plans for now and the future, take advantage of Ex-Cell-O's substantial background of practical engineering experience in the designing and manufacture of precision machine tools and Continental cutting tools. Send for your free copy of General Products Folder No. 27132.

EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

XLO
EX-CELL-O *for* PRECISION

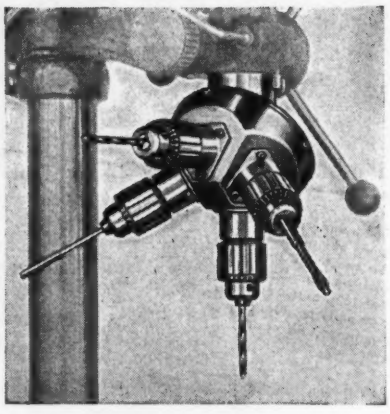
SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • BROACHES AND BROACH GRINDING MACHINES • HYDRAULIC POWER UNITS GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS • TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PURE-PAK MILK CONTAINER MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

This tool can be used on hexagonal, square, or rough-forged shafts. The rolls run on the surface finished by the tool, thus insuring a uniform diameter the full length of the machined shaft, regardless of looseness or play in the spindle, saddle, or cross-slide. After starting the cut, no tailstock support is needed because the attachment itself holds the work in the central position. Work can be performed on shafts several feet from the chuck without using a tailstock support.

The attachment is shown in Fig. 2 arranged for cutting Acme threads. Operations for which the attachment is adapted include the production of ordinary washers on an engine lathe. The Model B attachment can be set up on a lathe for drilling, plunge-cutting to size, and cutting off duplicate parts with a high degree of precision.....82

Turret Attachment for Drill Presses

A turret attachment for drill presses has been brought out by the Chicago Drillet Corporation, 919 N. Michigan Ave., Chicago 11, Ill. This new unit, bearing the trade name "Quadrill," is a precision-built rotary device that holds four tools and permits the desired tool to be placed in the working position by a simple flick of the finger, thus eliminating the necessity for changing tools, as must be done when using the single-chuck drill press. It will handle all regular drill-press work, such as drilling, counterboring, reaming, center drilling, countersinking, and spot-facing, and, according to the manufacturer, it actually permits



Turret Attachment for Drill Presses

one drill press to do the work of four single-spindle drill presses.

Only the drill in the working position rotates, the other three remaining stationary. The entire unit is assembled to the quill of the drill press and is driven from the spindle. Hardened friction starter and driver members assure clash-free synchronization of the driver teeth. The four hardened and ground spindles are designed to take No. 32 Jacobs chucks or their equivalent. Ball bearings are used in all spindle assemblies.....83

Carbide Tools for Small Precision Lathes

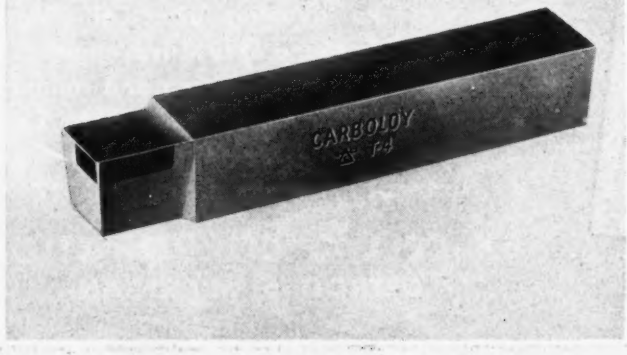
In line with the increasing use of carbide-tipped tools on small high-speed precision lathes, as well as in boring-bars and in toolholders for fine work, Carboloy Company, Inc., 11147 East 8 Mile Blvd., Detroit 32, Mich., has added a 1/4-inch size carbide tool to its line of Style 4 and Style 7 right- and left-hand standard turning tools.

The new tools, available from stock in Grade 78 for steel cutting and in Grade 883 for all other materials, have a 1/4-inch square shank, 1 1/2 inches long. They have a tip 3/32 inch thick, 3/16 inch wide, and 5/16 inch long. The tools are being regularly packaged for shipment from stock in lots of twelve, although they are also available in other quantities.....84

Clark Adjustable Tool-Holder

A new adjustable tool-holder for use in lathes, shapers, and planers, which has a vise-grip jaw of special design, has been announced to the trade by the Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif. The adjustable feature makes possible the use of any of four or more sizes of tool bits in the same holder, thus permitting bits of different sizes to be used without changing holders. The holder is available in the 15-degree sloping cutter channel type and in the horizontal or parallel channel type, in both right- and left-hand offset models. Each type can be furnished in several shank sizes.

The special vise-grip jaw has a unique clamping action, which holds the bit in the vertical and horizontal planes with evenly distributed pressure. This prevents tool-bit breakage and eliminates the possibility of a troublesome pocket or sag developing at the bottom of the holder channel opposite the clamping screw. The vise grip also has the advantage that it will hold very short tool



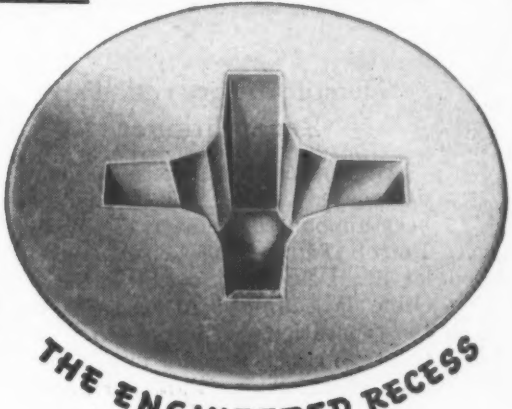
Carbide-tipped Tool for Small Precision Lathes Brought out by Carboloy Company

Clark Adjustable Tool-holder, Designed to Accommodate Four or More Tool Bits

To obtain additional information on equipment described on this page, see lower part of page 198.

WHEN THIS → WANTED Assembly Workers DREW A BLANK

THE BOSS TORE HIS HAIR UNTIL SOMEONE WISED HIM UP TO THIS → → THE RECESSED HEAD SCREW THAT UPS DRIVING SPEED AS MUCH AS 50% IT'S PHILLIPS



Stymied because you've just got to boost assembly department output and you can't hire more workers to do it? No need to be!

You can boost output another way – by switching to Phillips Recessed Head Screws. They will increase driving speed as much as 50 percent. They have done it for hundreds of plants!

With Phillips Recessed Head Screws, your workers encounter none of the troubles that cause slow driving. Spiral and power driving can be used where speed tools have always been impractical. And, the work becomes so much easier that assemblers can maintain a fast pace throughout a shift.

Switch to Phillips Recessed Head Screws. You'll find they'll give you faster driving, easier driving, greatly increased output. You'll also find they *cost less to use!*

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS · MACHINE SCREWS · SELF-TAPPING SCREWS · STOVE BOLTS

TO MAKE WARTIME QUOTAS AND PEACETIME PROFITS

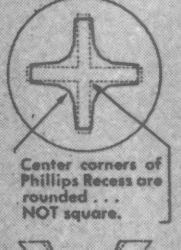
Faster Starting: Driver point automatically centers in the Phillips Recess . . . fits snugly. Fumbling, wobbly starts, slant driving are eliminated. Work is made trouble-proof for green hands.

Faster Driving: Spiral and power driving are made practical. Driver won't slip from recess to spoil material or injure worker. (Average time saving is 50%.)

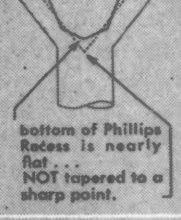
Easier Driving: Turning power is fully utilized. Workers maintain speed without tiring.

Better Fastening: Screws are set-up uniformly tight, without burring or breaking of screw heads. The job is stronger, and the ornamental recess adds to appearance.

IDENTIFY IT!



Center corners of Phillips Recess are rounded . . . NOT square.



bottom of Phillips Recess is nearly flat . . . NOT tapered to a sharp point.

24 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Wolverine Bolt Co., Detroit, Mich.

bits rigidly, thus effecting economies by permitting short pieces of tool bits to be used.

Square, round, out-of-round, under-size, or dual narrow bits for cut-off or forming operations can all be held securely. This ability to hold narrow tool bits saves time and avoids tool steel waste by eliminating the necessity for grinding square bits down to narrow shapes for cutting off and special turning, grooving, threading, and facing operations.

These new tool-holders are especially well adapted for holding Stellite and other extra hard cast-alloy tool bits, since the even distribution of pressure in the holder serves to prevent breakage of the brittle expensive alloys, and the design provides the required maximum frontal support for the cutting edges of carbide tools. 85

Detroit Improved Tap Reconditioner

An improved tap reconditioner, designated Model DTR-3, has just been announced to the trade by the Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich. This machine is equipped to perform all the operations required to keep taps in first-class condition, including chamfering, flute grinding, spiral pointing, and point polishing. The new equipment provides for grinding the full length of tap flutes, in addition to performing the operations handled by the original machine. Taps with two, three, four, five, or six flutes can now be ground on one head.

The new chamfering head employs quick-change type collet chucks for taps with standard size shanks. The collet chucks are interchangeable in the chamfering unit and in the unit employed for flute grinding and spiral pointing. These chucks are attached by a simple draw-bar, thus eliminating the use of lock-nuts. The tap-chamfering unit, as well as the flute-grinding and spiral-pointing units, will accommodate collets ranging in capacity from the smallest machine screw size up to 1 1/4-inch standard tap shank size.

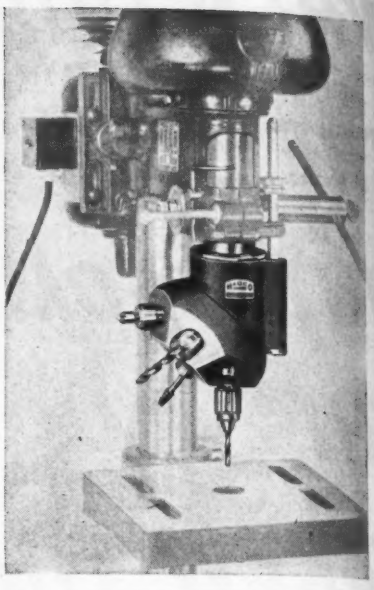
The spindle head is designed to accommodate a wide range of motor types. A separate motor-driven unit with a cone-shaped wheel mounted in the machine base is furnished as standard equipment for spiral-point polishing and similar work. The 1/2-H.P. spindle motor is controlled by a manual switch in the machine base. Standard motors are 220- or 440-volt, three-phase, and 110-volt, single-phase for either 25- or 60-cycle service. Included as standard accessories are a tap locator and three index disks for flute grinding and spiral pointing. 86

Improved Tap Reconditioner Made by Detroit Tap & Tool Co.

"Madco" Turret-Head Attachment for Drill Press

A "Madco" turret attachment for small type drill presses has recently been brought out by the Machine Development Co., 516 Fifth Ave., New York 18, N. Y. This attachment is designed to adapt single-spindle drill presses for multiple-spindle operations. It can also be used for tapping when the drill press is equipped with a reversible motor. The model shown in the illustration has six spindles, and will take drills up to 3/8 inch in diameter.

The attachment can be quickly mounted in place on the lower end of the drill-press quill by means of a collar which is locked in position with three set-screws. The only change necessary on the drill press is removal of the chuck, which is replaced by the special driving mechanism supplied with the turret attachment. An ingenious clutch arrangement is employed, which is designed to drive the individual spindles in accurate alignment with the main drill-press spindle.



"Madco" Turret Head for Single-spindle Drill Presses

When the turret head is in operation, the worker merely has to raise the drill-press lever, turn the head to any station desired, and then lower the feeding lever as in a normal drilling operation. A ball and detent arrangement serves to indicate when the head is indexed to the correct position, and there is a special clutch which automatically engages and aligns the spindle for drilling.

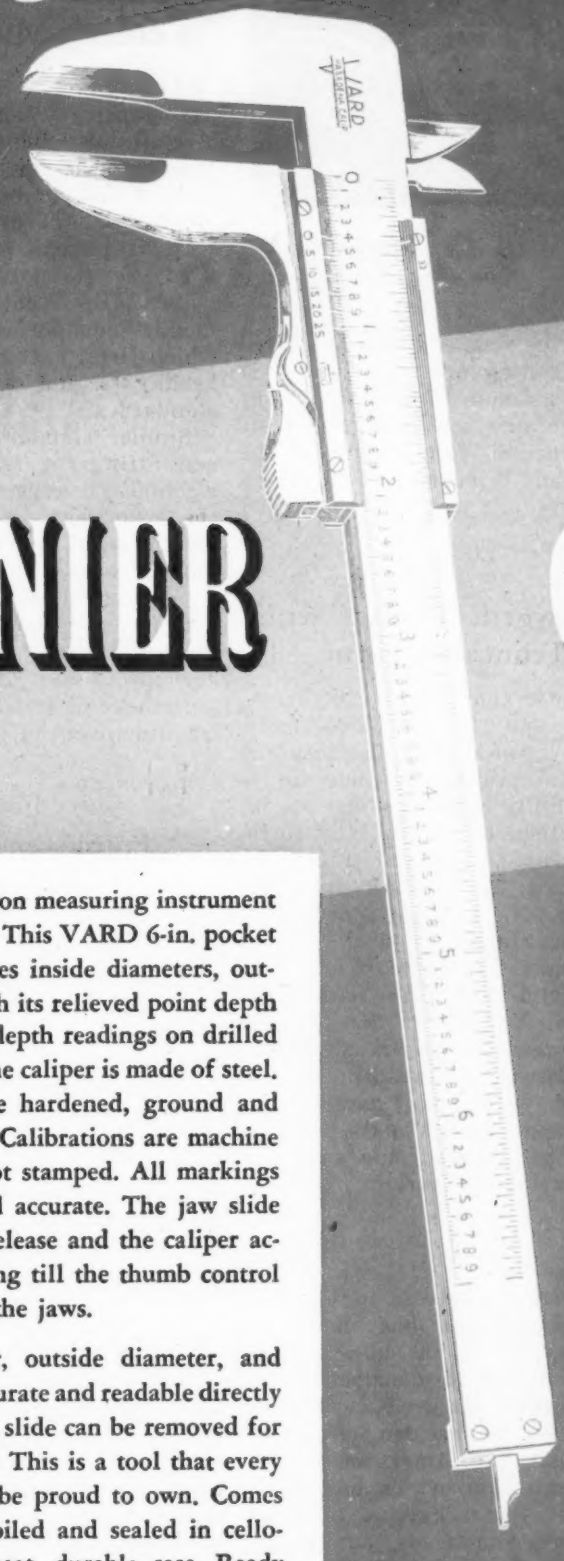
The turret head can be equipped either with six screw chucks, which are furnished blank so that the user can drill them to suit his own applications, or with six adapters for No. 1 Jacobs chucks, or with a combination of both. Adapters can be furnished at slight additional cost for Nos. 2 and 3 Jacobs chucks. An automatic indexing depth stop and an adapter collar which enables the turret head to be attached to a 17-inch Delta drill press are also available as extra equipment. 87

Stainless-Steel Arc-Welding Electrodes

A stainless-steel arc-welding electrode which performs equally well when welding with alternating or direct current in all positions has been developed by the Alloy Rods

To obtain additional information on equipment described on this page, see lower part of page 196.

VARD



VERNIER CALIPER

Here is a fine, precision measuring instrument r the machine trades. This VARD 6-in. pocket nier caliper, measures inside diameters, out- le diameters, and with its relieved point depth ge, accurately gives depth readings on drilled les up to 6-inches. The caliper is made of steel. easuring surfaces are hardened, ground and in jaws are lapped. Calibrations are machine vided and etched, not stamped. All markings e clear, readable and accurate. The jaw slide s a thumb control release and the caliper ac- rately holds its setting till the thumb control mits movement of the jaws.

All inside diameter, outside diameter, and pth readings are accurate and readable directly .001-in. The vernier slide can be removed for aning and resetting. This is a tool that every ster mechanic will be proud to own. Comes you carefully set, oiled and sealed in cello- ane. Packed in a neat, durable case. Ready ship on order.

rite for descriptive literature and price sheet.

VARD INC.
PASADENA 8, CALIF.

Co., York, Pa. The manufacturer states that these electrodes have exceptionally low spatter loss; the slag is easily removed; and the arc is instantly established. Accepted-contour welds can be made in horizontal, vertical, or overhead positions. 88

Improved Welding Goggle

An improved Duraweld goggle—the AO 404A—designed to provide better protection and greater comfort for welders' eyes, is announced by the American Optical Co., Southbridge, Mass. The goggle is fitted with Noviweld lenses in five shades or with Filterweld, Noviweld-Didymium, or Super Armorplate

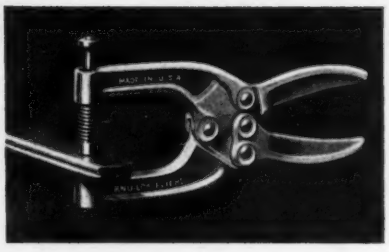
Welder Using Improved Duraweld Goggle

Calobar lenses. Newly designed eye-cups, anatomically molded for the right and left eye, have larger and more comfortable edges rounded to fit the contour of the face. 89

Knu-Vise Improved Work-Gripping Plier

A work-gripping plier of improved design having a self-setting pressure spindle that compensates for any variations in the thickness of the parts clamped has been brought out by Knu-Vise, Inc., 2208 Eighth St., Detroit 16, Mich. This plier, styled "Vari-Grip," has been especially developed to hold the thin sheet-metal skin of airplane wings during riveting operations.

By compensating for small differences in skin thickness, this plier has made possible large savings in the time and effort required in fabricating aircraft wings. It has a maximum throat capacity of 3/8 inch and a throat depth of 2 5/8 inches. The length of the tool is only 8 inches, and it weighs 22 ounces. 90



"Vari-Grip" Plier Made by Knu-Vise, Inc.

* * *

Whitworth Threads with Truncated Form

In order that Whitworth screw threads can be produced more easily by American manufacturers while maintaining complete interchangeability with the threads of the British Standard Whitworth Form, the American Standards Association, 29 W. 39th St., New York 18, N. Y., has approved a new war standard called "Screw Threads of Truncated Whitworth Form, B1.6-1944." The American truncated Whitworth threads are interchangeable with British Standard Whitworth threads, can be produced with tools having flat crests and roots, and can be checked with thread plug and ring gages having flat crests.

* * *

American business and industrial management has made its mistakes, but it has also demonstrated and is demonstrating in the war effort its great capacities. It must not be shackled. Shall we admit that the American genius for organization, which has given the world the techniques of mass production and made our living standards the envy of all other nations, cannot solve the problem of an equitable distribution of the abundance we can produce? Shall we resign ourselves to compulsive distribution by a super-government?—*Eric A. Johnston, President, Chamber of Commerce of the United States*

Standardization of Welding Machine Parts

At a recent meeting of the Resistance Welder Manufacturers Association, John Diebold, welding engineer for the General Motors Truck and Coach Division, emphasized the need for standardization of small parts and fittings used in resistance welding machines. He mentioned the automobile industry as an example, in which tires, batteries, spark plugs, headlights, and other parts are of standard size on all cars.

Similar standardization of parts and fittings of resistance welding machines, irrespective of who built the equipment, would greatly benefit the user, and make it unnecessary to carry as large an inventory of special parts for each type of machine as is now required. Such standardization, he said, is the keynote to the ultimate universal acceptance of resistance welding by manufacturers of metal products.

* * *

Employer-Employe Relations

A valuable contribution to the subject of employer-employe relationship was made in an address by Charles S. Redding, president of the Leeds & Northrup Co., Philadelphia, Pa., before a recent meeting of the Metal Manufacturers' Association of Philadelphia. This address is available in booklet form, and can be obtained on request from L. R. Garretson, Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.

* * *

Wealth is created chiefly by invention going into partnership with capital. People think that capital means "millions." As a matter of fact, it often means anywhere from $50 to $500. An inventor has an idea. He knows a machinist who has saved up $500 (that makes him a capitalist). So the inventor takes his idea and his friend the $500; they perfect the invention and put it on the market. If the public likes it, the business grows. New plants are built; ultimately they may employ thousands of men.—*George T. Trundle, Jr., in "Trundle Talks"*

To obtain additional information on equipment described on this page, see lower part of page 198.

ONE OIL CHANGE
and this "chaser" tapped
10 TIMES
AS MANY SHELLS!

SUNICUT

permits 21,600 more pieces per chaser

Twenty-four thousand shells instead of twenty-four hundred per chaser life! A big saving in tool setter's time . . . a big increase in output per machine tool. All because a large manufacturer of high explosive shells changed the cutting lubricant on a tapping operation to Sunicut, the transparent, sulphurized cutting oil developed by Sun Oil Engineers.

Greater production demands required that they tap more shells per chaser grind . . . more shells per chaser life. So they asked Sun Cutting Oil Engineers how it could be done. Sunicut was the answer . . . the proof is in the results.

With Sunicut . . . output increased from the old rate of 600 pieces, to 4300 pieces per chaser grind . . . and from 2400 pieces, to 24,000 pieces per chaser life. In addition, finish was improved.

Sunicut's advantages are extremely high heat-absorbing and metal-wetting ability, and clearer work visibility. These make possible longer tool life, greater speeds, finer finish, and increased operator interest. Find out what Sunicut can do in your own plant . . . under your own operating conditions. Consult a Sun Cutting Oil Engineer, today. Write

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

Treasury Department Discourages Incentives for Workers

Through its incentive system of payment, the Lincoln Electric Co., Cleveland, Ohio, has encouraged its workers to increased productive efficiency. In testimony given some time ago before the Ways and Means Committee of the House, James F. Lincoln, president of the company, told the Committee that a representative of the Treasury Department had told him that there is a limit to what should be paid a man who works with his hands.

Furthermore, despite evidence proving that the system of incentive pay for workers which was installed at the Lincoln plant many years ago has been directly responsible for saving the United States Government many millions of dollars for equipment needed for war production, the Treasury Department insists on penalizing the Lincoln company for doing the very thing that made these savings possible, and that has given the workers in the plant an opportunity to earn more than is ordinarily paid for similar work.

Recently, still harassed by the Treasury Department, Mr. Lincoln sent a letter to all the members of Congress in which he points out how the Treasury Department, through the assessment of back taxes, places a penalty on the incentive method of wage payment. According to Mr. Lincoln, the Treasury Department is unable to understand the fact that, because of this incentive system, the wages paid per piece produced are less than those of any other manufacturer making a comparable product. The Treasury Department, according to Mr. Lincoln, merely says that no man who works with his hands can be paid that much, regardless of what he does. This is a rather arbitrary idea.

Since the incentive method of payment is the most equitable method known that can be applied in industry, and the one that will assure, more than any other, the well-being and prosperity of the American worker, this matter is of importance to management and workers alike. Says Mr. Lincoln: "If the assessed penalty against us for the years 1940-41 is repeated in the following years, which undoubtedly will be done if the Treasury is successful in collecting this first assessment, it means insolvency for the Lincoln Electric Co. Since we are the outstanding example of incentive wage payment, such an outcome must eliminate all incentive throughout American industry."

Mr. Lincoln further believes that if an incentive system such as that applied by the Lincoln company had been applied generally throughout industry, it would have been possible to produce the tools of war for less than half the present cost. This may seem like a very strong statement, but Mr. Lincoln has figures to show that back up his position. In the Lincoln plant, the average production value per man per year is more than double the average value in American industry generally. It certainly seems that no better argument could be advanced for the incentive system, where workers share in results.

Fire-Resistant Glass-Fiber Resin Laminate for Electrical Control Panels

To minimize the possibilities of fire, which could put the entire electrical system of a fighting ship out of commission, the Navy has adopted a fire-resistant, glass-fiber reinforced plastic material for the panel boards on which electrical control instruments are mounted. This new type of panel-board material is a laminate, built up of many layers of cloth woven from fibrous glass yarns, which is impregnated with a melamine resin. This development is the result of research initiated by the Navy Department and carried on with the cooperation of fabricators and manufacturers of electrical control equipment. In addition to being fire-resistant, the fibrous glass and melamine combination has high impact strength and high resistance to the carbonizing effect of the electric arc.

Dangerous Financing Policies

During a war, if a modern government is unable to raise through taxes or individual loans all the money needed, it can create deposits in commercial banks against which it can draw. It does this by issuing securities at low interest rates which the banks buy, crediting the proceeds to the government. This is a new and improved way of issuing fiat money.

The ability to finance a modern war also requires that government shall take away from its citizens all money of intrinsic value, such as gold, so that they will have only token money to be used as the government directs. Otherwise, the people would hoard or export it.

These are essential elements of "statism," as developed by the fascist governments. They are dangerous powers which should be abolished after the war.—*Stevenson, Jordan & Harrison, Inc.*

* * *

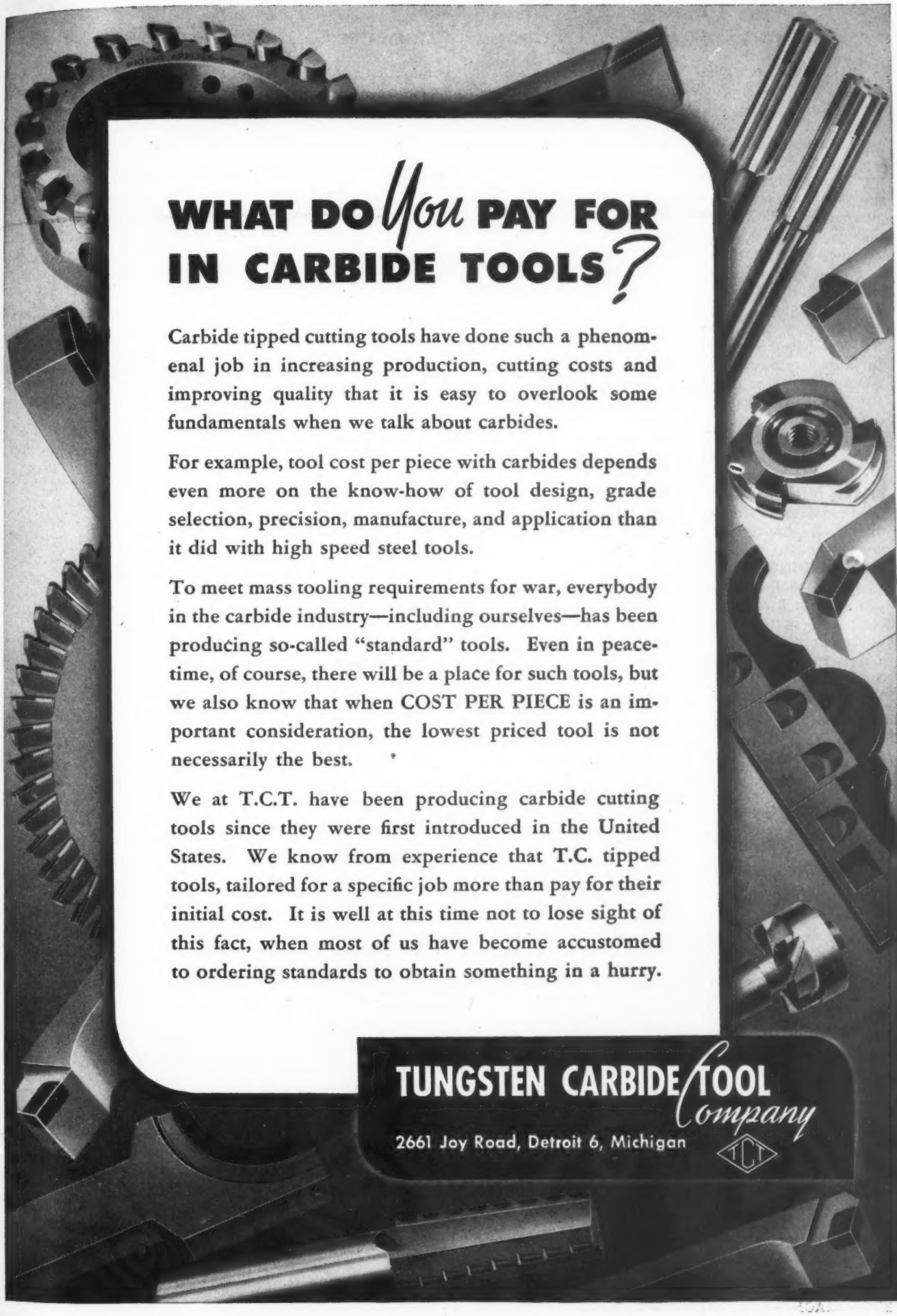
Performance by Carbide Tool Climb Milling

Many examples have been quoted indicating the possibilities of carbide tool milling. The following is quoted by the Carboloy Company: In milling forged Ni-Chrome steel, using a fly cutter that was tipped with a single blade of Carboloy No. 78-B, a speed of 550 surface feet per minute, with a feed of 7 inches per minute and a depth of cut of 1/4 inch, was employed. By climb milling, the finish obtained on the work was materially improved. The carbide fly cutter gave an average of 1500 pieces between tool grinds.

* * *

Device for Sharpening Twist Drills

An inexpensive, simple jig which enables even an inexperienced girl to grind a twist drill correctly in a very short time has been developed by A. D. McBurney, 939 W. 6th St., Los Angeles 14, Calif. This jig, used in connection with an ordinary grinding wheel, when properly mounted will handle drills from 3/32 inch to 1 1/16 inches in diameter and up to 11 inches long.


WHAT DO You PAY FOR IN CARBIDE TOOLS?
Carbide tipped cutting tools have done such a phenomenal job in increasing production, cutting costs and improving quality that it is easy to overlook some fundamentals when we talk about carbides.
For example, tool cost per piece with carbides depends even more on the know-how of tool design, grade selection, precision, manufacture, and application than it did with high speed steel tools.
To meet mass tooling requirements for war, everybody in the carbide industry—including ourselves—has been producing so-called "standard" tools. Even in peacetime, of course, there will be a place for such tools, but we also know that when COST PER PIECE is an important consideration, the lowest priced tool is not necessarily the best.
We at T.C.T. have been producing carbide cutting tools since they were first introduced in the United States. We know from experience that T.C. tipped tools, tailored for a specific job more than pay for their initial cost. It is well at this time not to lose sight of this fact, when most of us have become accustomed to ordering standards to obtain something in a hurry.
TUNGSTEN CARBIDE TOOL Company
2661 Joy Road, Detroit 6, Michigan
TCT

Vacuum Test Pit for High-Speed Impellers

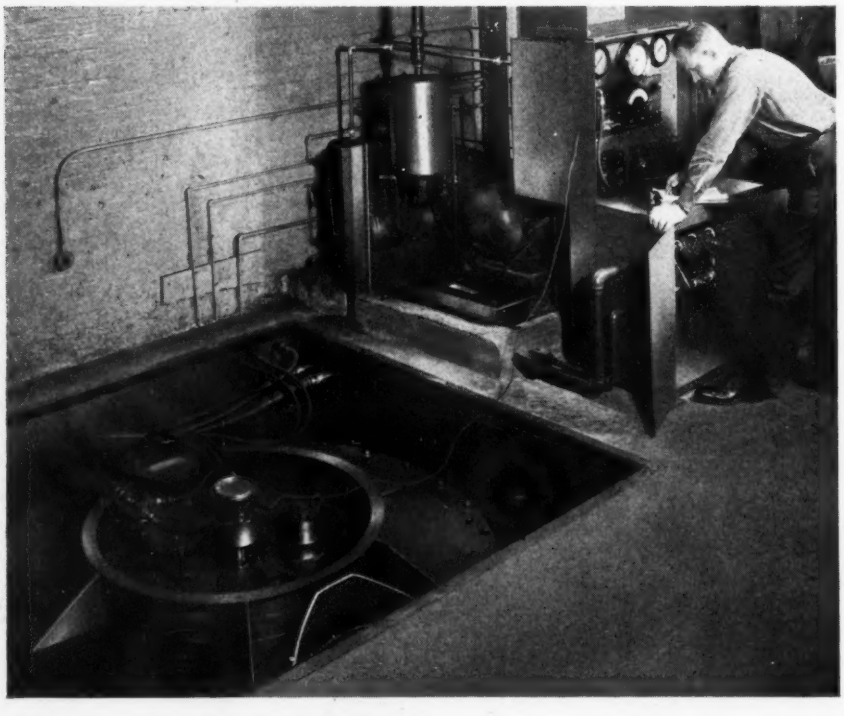
The extent to which stresses are being studied to improve the quality of high-speed rotating machinery is indicated by the installation of a large vacuum test pit in the research laboratory of the Buffalo Forge Co., Buffalo, N. Y. The pit, so termed because the shell is set in concrete below the floor level, as shown in the accompanying illustration, is 6 feet in diameter by 4 feet deep. It is made of heavy reinforced construction to withstand absolute vacuum. While it was designed along the lines of the General Electric device for testing turbo-supercharger impellers, and is capable of operating at 60,000 R.P.M., it will generally accommodate larger fans at lower speeds.

An impeller to be tested is hung by a slender shaft from a small air turbine mounted on the cover of the test pit. A vacuum pump then exhausts the air from the drum, so that it requires almost no power to spin the fan. The pressure within the drum may go as low as 200 microns of vacuum (0.00787 inch of mercury absolute, compared with standard atmospheric pressure of 29.92 inches of mercury). Under these conditions, the power required to drive the fan, exclusive of the turbine friction, is actually about 1/4000 of that needed under normal conditions.

The acceleration must be gradual, the speed being under the constant control of the operator by means of an air valve and air brake. In order to keep the speed indicating device from absorbing power at the higher speeds, an electronic frequency meter is used. This is a direct-reading dial type instrument provided with suitable amplification.

A test pit of this type serves to insure safety of operation of cast or fabricated fans, since the fan may be run at speeds sufficiently above the operating speeds to permit calibration of the factor of safety. In the case of new designs, the impeller may be tested to destruction in order to determine the weakest section or some unpredictable condition. For this reason, there is supplied a laminated shield within the main shell, so that the force caused by rupture will spend itself against this shield without causing serious damage to the shell in which the vacuum is maintained.

A check on fan balance can be made on high-speed impellers that might otherwise be impossible except at final installation. Thus, a fan that would require 1000 H.P. to drive it at its normal operating speed can be run in a vacuum of 200 microns of mercury by a motor of only 1/4 H.P. The pit also affords the opportunity of studying stress conditions while the unit is in operation. For this purpose, a glass aperture in the cover of the pit permits the impellers to be viewed by stroboscopic light. Also, by the use of strain gages in a circuit with a cathode ray oscilloscope, it is possible to visualize and measure stresses and vibration amplitudes.



Vacuum Test Pit that Permits Impellers to be Tested at High Speeds with Small Motor

* * *

Machine Tool Shipments

The machine tool shipments for June—the last month for which the War Production Board has given out statistics—totaled $41,330,000, which is at an annual rate close to $500,000,000. The new net orders—that is, new orders less cancellations—for June amounted to $48,427,000, or at an annual rate of about $580,000,000.

The backlog of unfilled orders at the end of June was valued at $193,000,000. This is almost five months work for the industry at the rate of the June shipments.

* * *

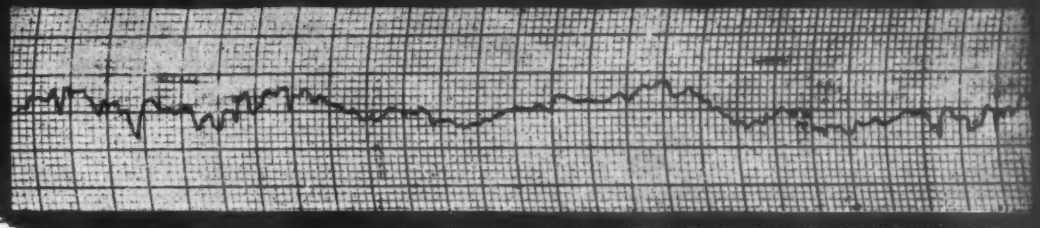
Detecting Porosity in Plated Coatings

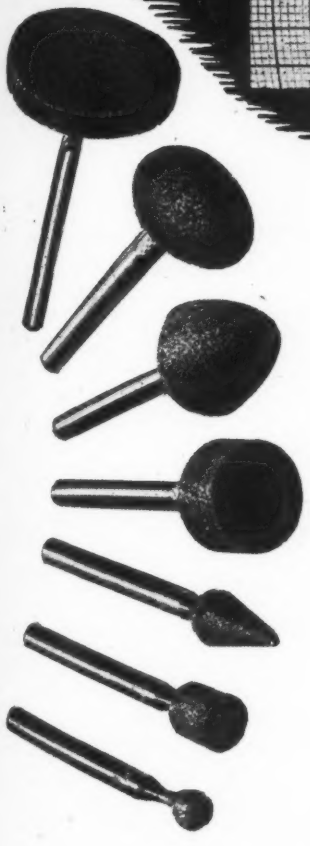
What is known as "Fotopor" paper is now being used for determining the porosity of nickel deposited on iron and steel. The Hanson-Van Winkle-Munning Co., Matawan, N. J., announces that this paper can also be used to test the porosity of the plating of chromium, copper, brass and tin over iron and steel, as well as chromium and tin deposited over copper and brass. Wherever iron or steel is exposed blue spots will appear on the paper, and where copper and brass are exposed, brown spots will appear.

* * *

The framers of our Constitution wisely judged that the less government interferes with private pursuits, the better for the general prosperity.—*President Van Buren in 1837*

Proof of a Better Finish





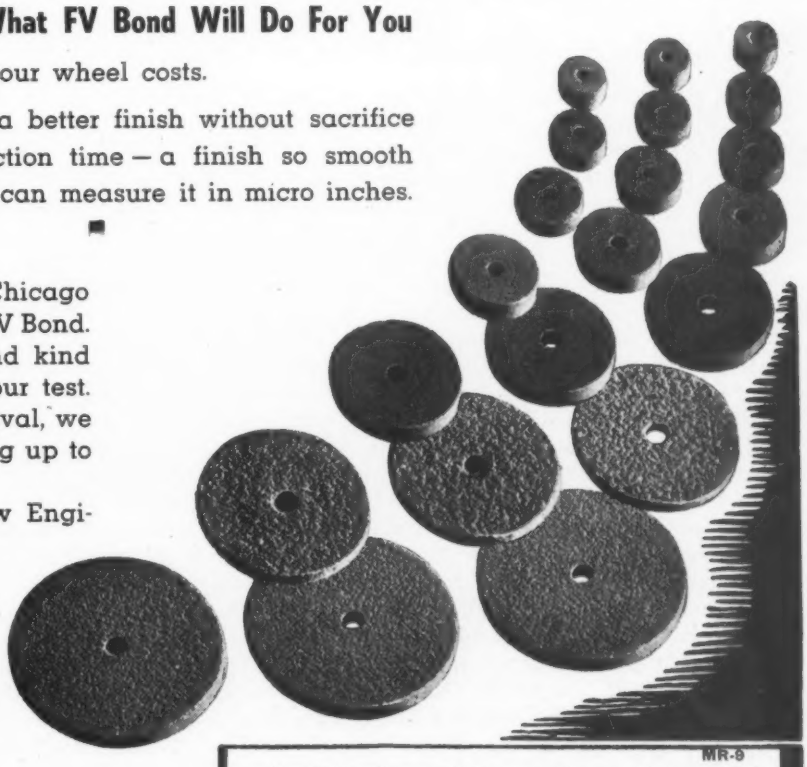
Surface Analyzer Tape Proves you Get a Better Finish with Chicago Wheels

These results were obtained at a rate of 10 pieces per hour in an aircraft parts plant. Material, X-13-15, Rockwell 60 to 57, grinds out .006 to .007 stock. Chicago Wheel used, 1/2 x 1/2 x 1/8", Grain 180, Grade L Arcite FV Bond. Spindle Speed 40,000 r.p.m. Lapping and super finishing eliminated on this job.

Can you match that finish? Sounds phenomenal, but you can do it with Chicago Wheels. And, the secret of their superiority lies in the new FV Bond, developed exclusively for Chicago Wheels, after 50 years' experience making wheels for the most accurate and precise applications.

Here's What FV Bond Will Do For You

- Reduce your wheel costs.
- Produce a better finish without sacrifice of production time — a finish so smooth that you can measure it in micro inches.



TRIAL WHEEL FREE!

Write or send the coupon today for a Chicago Wheel, made with this remarkable new FV Bond. Tell us grinder you use, size wheel and kind of material on which you will make your test.

For the duration, with full WPB approval, we are specializing on small sizes—anything up to 3" in diameter.

Write for Catalog and one of the new Engineering Survey Forms, a step in the direction of better finishing.

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SMALL GRINDING WHEELS

Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Industry.

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MR-9

Send Catalog and Survey Form. Interested in ☐ Mounted Wheels. ☐ Grinding Wheels. ☐ Send Test Wheel. Size .....

Name.....

Address.....

Engineer Has Full Set of MACHINERY Since First Number

In connection with the fiftieth anniversary of MACHINERY, it is of interest to note that Alden M. Drake, design engineer with the Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford, Conn., has a complete set of MACHINERY, beginning with Volume 1, No. 1, published in September, 1894.

Mr. Drake started his apprenticeship at the Fitchburg Machine Works, Fitchburg, Mass., in 1894, and bought the first issue of MACHINERY at a news-stand in that city. He immediately subscribed for MACHINERY, and has been a subscriber ever since.

Mr. Drake became connected with the engineering department of the Pratt & Whitney Co. in 1902, remaining until 1914. After having been with the Heald Machine Co., Worcester, Mass., for ten years as chief engineer, and with the Greenfield Tap & Die Corporation, Greenfield, Mass., for five years in a similar capacity, he returned to Pratt & Whitney.

Alden M. Drake, Design Engineer with Pratt & Whitney, Who, as an Apprentice, Bought the First Number of MACHINERY Issued, and Who has in His Library the Complete Fifty Volumes Published Since that Time

Gage Acceptance Clinic at Frankford Arsenal

The gage laboratory at Frankford Arsenal, Philadelphia, Pa., has been operating a Gage Acceptance Clinic for some time. One of the objectives of the gage laboratory at the Arsenal is to supply Government inspectors with gages that will insure acceptance of equipment that will function. It is to be noted that the emphasis is on the responsibility of the laboratory to accept gages within the limitations of the above objective. Too high a gage rejection rate retards inspection and final acceptance of war equipment. It is easy for inspection personnel to develop a negative or rejection complex. Under this influence, rejections, particularly in borderline cases, may be favored over acceptance.

It was the recognition of this psychological condition that was responsible for the creation of the Gage Acceptance Clinic of the laboratory. This clinic meets at the call of the foreman in charge of the inspection room, not more frequently than once a day. Its duties are to consider all borderline cases before gages are finally rejected. The Gage Acceptance Clinic is basically composed of three head executives of the gage laboratory, who have had long experience in the design, manufacture, and inspection of gages. The inspector and his immediate superior present the case. The members meet in the inspection room, where the gages in question, drawings, calculations, and other data are carefully considered.

An interesting feature in connection with this work is the manner in which it is carried out. When problems are discussed while men are comfortably relaxed in chairs, talk is generally long, while results may be short. This clinic, on the contrary, is what is known as a "stand-up" conference. All the members stand up during the session. This tends to keep the discussion to a minimum and assures that decisions are quickly reached.

The clinic insures that proper consideration is given to limitations of accuracy, equipment, and personnel, which factors are inherent in the application of every gage. It authorizes simple corrections, which can be made in the laboratory's small salvage shop.

During the months that it has operated, the clinic has demonstrated that it can fulfill an important purpose in the prosecution of the war. Its operations have been a definite encouragement to the gage industry as well, and many gages have been placed in the hands of ordnance inspectors months sooner than if borderline rejections had been made.

* * *

Thermoplastic Materials for Punches and Dies

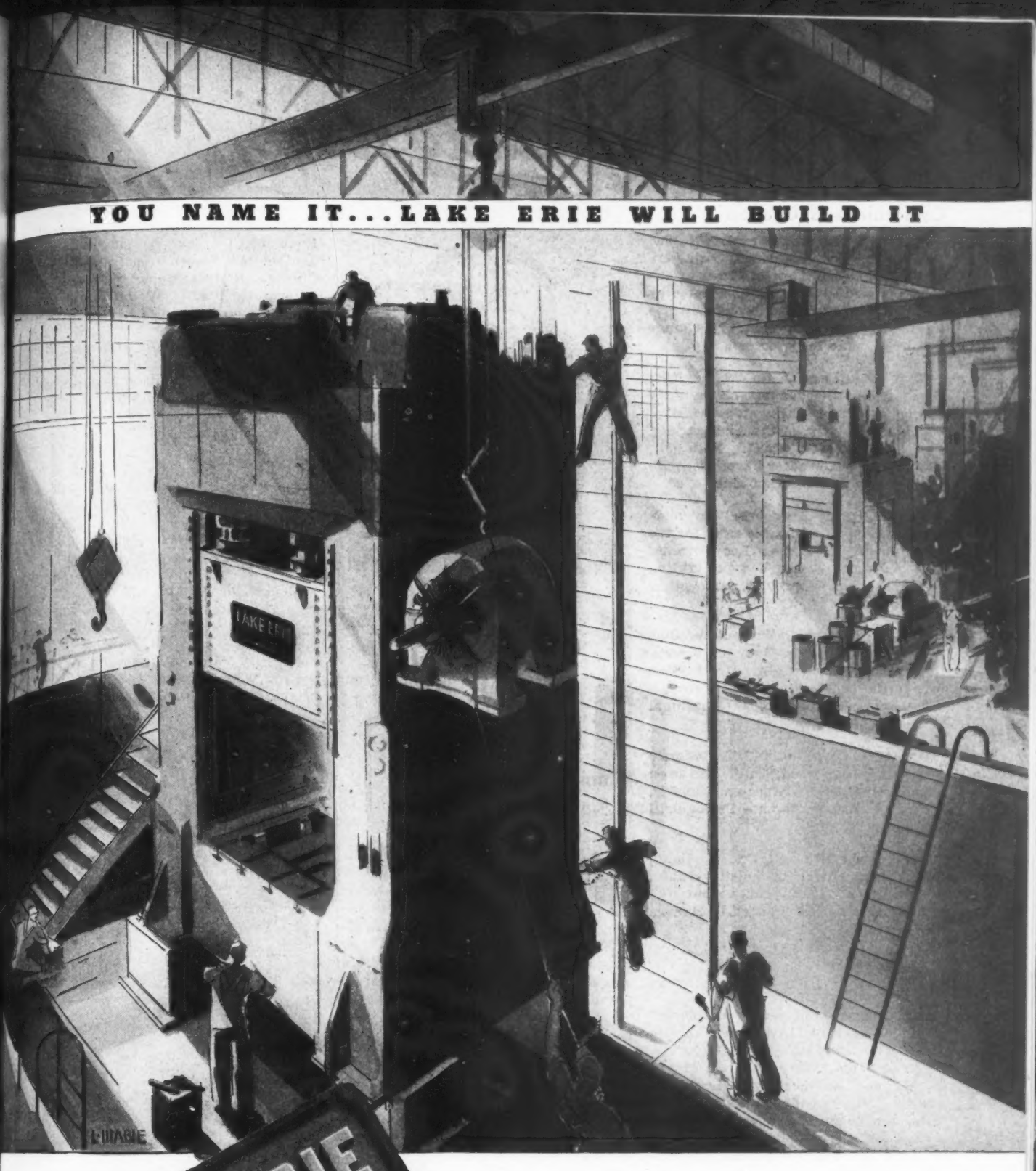
A booklet recently published by the Tennessee Eastman Corporation, Kingsport, Tenn., for the information of tool engineers, contains detailed information on the use of plastics for drop-hammer punches and forces, draw-rings for double-action draw presses, and other tools used in the forming of metal.

The advantages claimed in using plastics—in this case Tenite II—are as follows: This plastic will form sheet metal into the corners of a die without becoming rounded, as do lead and soft metal alloys; it can be cast to finished size in the die without the scraping and polishing which is necessary with metal punches; it is relatively unaffected by temperature changes; the composition can easily be made harder or softer; and a finished Tenite casting is readily machined.

* * *

Measuring Machine Became Unreliable Daily at 2 P.M.

We are told of a delicate measuring machine in a war production plant that lost its extreme accuracy every afternoon at 2 P.M. The machine was used in an air-conditioned room, and there seemed to be no reasonable explanation of the difficulty. Finally it was discovered that about that time each day a sunbeam shone down on the instrument through a pin-hole in a blacked-out windowpane. Notwithstanding the air-conditioned room, the heat of that tiny sunbeam expanded the measuring device sufficiently to throw it off.



LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

***LAKE ERIE** offers the services of an organization headed by a capable engineering staff, skilled in the design of special machinery, and a modern plant equipped for production to precise tolerances.*

News of the Industry

California and Oregon

PACIFIC RAILWAY EQUIPMENT CO., 960 E. 61st St., Los Angeles 1, Calif., announces that the name of the firm has been changed to PRECO, INC., a name by which the company has been known to its customers for some time. No change has been made in personnel.

K. S. RAMEY and J. R. WALKER have been appointed managers of the California and mid-continent sales divisions, respectively, of the Axelson Mfg. Co., Los Angeles, Calif. Both Mr. Ramey and Mr. Walker have been with the Axelson organization since 1923.

DONALD B. MACAFEE has been made vice-president in charge of sales for the Benchmaster Mfg. Co., Los Angeles, Calif., maker of bench type milling machines, punch presses, and other machine tools.

A. J. HANLON has been made production manager of the Harvill Corporation, Los Angeles, Calif. Mr. Hanlon was formerly manager of the production department of the International Nickel Co., New York.

UNIVERSAL TOOL CO., 919 E. Redondo Boulevard, Inglewood, Calif., has been formed by EARL C. PARKHURST and P. W. BREENE to manufacture Parlec drill jigs and other tools.

WILLAMETTE HYSTER CO., Portland, Ore., manufacturer of hoists, cranes, lift-trucks, etc., announces that the firm name has been changed to HYSTER CO.

Indiana

ELIAS C. ATKINS has been elected president of E. C. Atkins & Co., Indianapolis, Ind., saw manufacturers, succeeding his father, the late Henry C. Atkins. Another son, KEYES W. ATKINS, vice-president and general sales manager of the concern, has been elected to the position of first vice-president in charge of sales.

E. E. LEVAN has been elected president of Haynes Stellite Co., a Unit of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York City. Mr. LeVan graduated from Pennsylvania State College in 1917, with a degree in mechanical engineering. After five years with the Bethlehem Steel Co., he came to the Haynes Stellite Co. as sales engineer in 1922, becoming chief engineer three years later. In 1929, he became general sales manager and was elected vice-president in 1939. He will make his headquarters at Kokomo, Ind., where the general offices and plant of the Haynes Stellite Co. are located.

E. E. Le Van, New President of Haynes Stellite Co.

Illinois

CLAYBORNE DISTRIBUTORS, LTD., has been organized in Chicago, Ill., to act as agents for the distribution of aircraft equipment, parts, and accessories, as well as other related industrial products. The concern will maintain warehouse facilities at strategic distribution centers, and will be in a position to offer engineering, sales, and merchandising service to manufacturers of aviation equipment and parts, who are planning now for post-war distribution of their products. NORMAN F. CLAYBORNE, president of the Clayborne Mfg. Co., heads the new organization.

ELMER C. MAYWALD, plastics consultant, has been appointed representative of Lester-Phoenix, Inc., Cleveland, Ohio, in the Chicago territory. Mr. Maywald will handle the company's complete line of plastic molding and die-casting machinery in northern Illinois, western Michigan, northern Indiana, Iowa, Minnesota, and Wisconsin.

GUY E. HAIRSTON has been appointed manager of the Atlanta district sales territory of American Machine & Metals, Inc., East Moline, Ill. His headquarters will be at 907 Candler Building, Atlanta, Ga. Among the products of the organization that he will handle are Tolhurst centrifugals and Riehle testing machines.

CHARLES L. SAUNDERS, formerly vice-president of the Minneapolis-Honeywell Regulator Co., has become vice-president of the Wheelco Instruments Co., Chicago, Ill. Mr. Saunders is a graduate of the University of Virginia in electrical engineering.

FISHER FURNACE CO., Chicago, Ill., has purchased the industrial furnace business of the MONARCH ENGINEERING & MFG. CO., Baltimore, Md.

Michigan

FREDERICK C. KNOWLES has been appointed Boron carbide engineer by the Norton Co., Worcester, Mass. He will make his headquarters at the Norton Detroit, Mich., warehouse, and will cover the Cleveland, Detroit, and Chicago territories. Mr. Knowles will devote a considerable part of his time to engineering work on the application of Norbide gages.

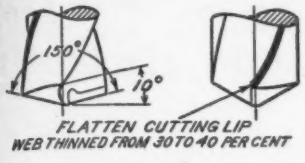
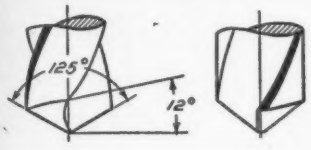
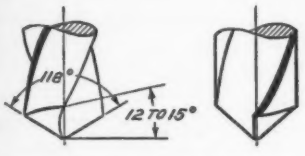
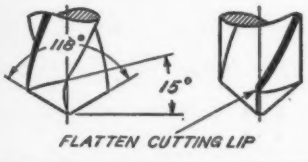
L. F. WEYAND, general sales manager of the Minnesota Mining & Mfg. Co.'s Adhesive and Coatings Division since 1936, has been made general manager. Mr. Weyand has been associated with the organization for twenty-eight years. He will continue to maintain headquarters at the company's factory in Detroit, Mich.

JAMES R. LONGWELL has been appointed director of engineering and research for the Carboloy Company, Inc., Detroit, Mich. Mr. Longwell has been

James R. Longwell, Director of Engineering and Research for Carboloy Company, Inc.

MACHINERY'S DATA SHEETS 521 and 522

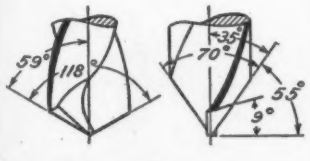
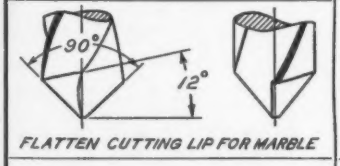
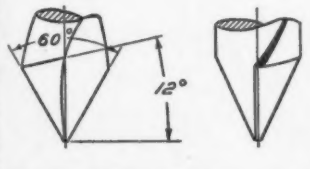
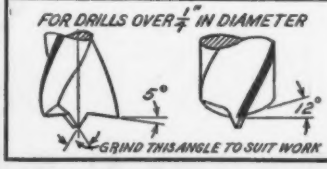
DRILL POINTS AND CUTTING FLUIDS FOR DIFFERENT MATERIALS—1

Drill Points	Metals to be Drilled	Cutting Fluid
	Manganese steel with from 7 to 13 per cent manganese Hard metals in general	Emulsifiable or soluble oils and compounds Soda-water emulsions Sulphurized oils (not to be used with carbide-tipped drills)
	Heat-treated steels Alloy steels, 240 Brinell Drop-forgings	Emulsifiable or soluble oils and compounds Soda-water emulsions Sulphurized oils (not to be used with carbide-tipped drills)
	General work Soft steel Annealed tool steel Forged soft steel Cast steel—cast iron	Emulsifiable or soluble oils and compounds Soda-water emulsions
	Soft bronze Brass	Dry or Emulsifiable or soluble oils and compounds Soda-water emulsions

MACHINERY'S Data Sheet No. 521, September, 1944

Based on the practice of the Westinghouse Electric & Mfg. Co.

DRILL POINTS AND CUTTING FLUIDS FOR DIFFERENT MATERIALS—2

Drill Points	Metals to be Drilled	Cutting Fluid	Non-Metallic Materials to be Drilled	Cutting Fluid
	Deep holes in soft steel	Emulsifiable or soluble oils or compounds Mineral lard oils (mixture of mineral and fatty oils) Sulphurized oils		
	Deep holes in cast iron and hard steel	Sulphurized oils (not to be used with carbide-tipped drills)		
	Deep holes in nickel and manganese alloys	Mineral lard oils Sulphurized oils		
	Aluminum alloys	Dry, or emulsifiable or soluble oils or compounds Soda-water emulsions (Up to 15 per cent dilution with kerosene may be used)	Plastics Marble	Dry
	Aluminum	Dry, or emulsifiable or soluble oils or compounds Soda-water emulsions (Up to 15 per cent dilution with kerosene may be used)	Wood Hard Rubber Fiber Plastics	Dry
	Die-castings	Dry, or emulsifiable or soluble oils or compounds Soda-water emulsions		
	Sheet metals Copper	Dry, or emulsifiable or soluble oils or compounds Soda-water emulsions	Wood Fiber Plastics	Dry

MACHINERY'S Data Sheet No. 522, September, 1944

Based on the practice of the Westinghouse Electric & Mfg. Co.

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MACHINERY'S Handbook contains 1815 pages of mechanical tables, rules, formulas and general data needed wherever machines, tools or other mechanical appliances are designed and constructed. It is reliable, complete, and simple in arrangement and is full of standard data and thoroughly practical information.

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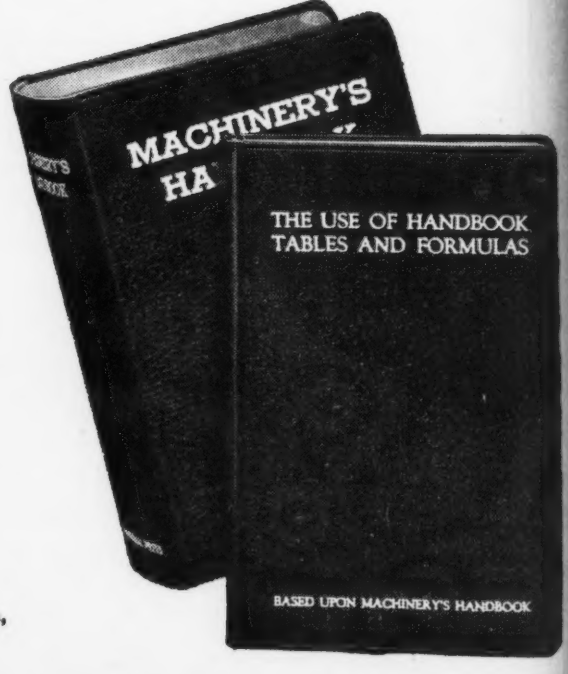
A companion book which shows you how to get the most out of MACHINERY'S HANDBOOK

This companion book, which costs only $1, serves three purposes: It throws the spotlight on a lot of essential time-saving tables, rules and general information in MACHINERY'S Handbook that the ordinary user never discovers.

A second and equally important function is to show by examples, solutions and test questions, typical applications of handbook matter in both drafting rooms and machines shops. A third object is to provide test questions and drill work designed for use in technical schools and machine-shop training courses so that students will learn at the outset how to apply an engineering handbook.



203 Pages, 63 Illustrations, 500 Problems, Exercises, Test Questions, Price $1; with MACHINERY'S HANDBOOK, $7.

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

connected with the company for fifteen years, and has served successively as development engineer, chief engineer, and factory manager.

E. J. DELVECCHIO has been made field sales manager for the Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich. He will supervise all field sales activities outside of the Detroit area. HARRY S. ROSE, formerly chief sales engineer, has been made sales manager for the Detroit district.

WALL-COLMONOY CORPORATION, Detroit, Mich., manufacturer of hard-facing alloys and overlay metals, has organized the MACHINE TOOL WELDING DIVISION of the company, located at 19351 John R St., Detroit 3, Mich. The new division will handle the corporation's custom and contract welding.

ELMER W. PFEIL has been made vice-president and general manager of the Anker-Holth Mfg. Co., Port Huron, Mich. Mr. Pfeil was formerly with the Republic Steel Corporation as manager of the salvage and reclamation department.

Minnesota and Nebraska

ANDERSON MACHINE TOOL CO., 2645 University Ave., St. Paul 4, Minn., has been appointed special distributor of Tocco process induction equipment, made by the Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland 1, Ohio. The Anderson company will serve the Wisconsin-Minnesota area.

WHITING CORPORATION, Harvey, Ill., has appointed the CARDINAL SUPPLY & MFG. CO., 427 Sunderland Bldg., Omaha, Neb., exclusive sales representative in the Nebraska and western Iowa territory. The Cardinal company will handle Whiting cranes and railroad, foundry and aviation equipment, as well as the Quickwork line of metal-working machinery.

New England

ALBERT W. COLEMAN has been appointed sales manager of Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Mr. Coleman has been with the organization for the last twenty-three years. E. M. DUNLAP has been made manager of distributor sales of the company. For the last ten years he has been sales manager of Ostermoor & Co., Bridgeport, Conn. RUDOLF BECK has been appointed chief engineer of American Instrument Division of Manning, Maxwell & Moore, Inc.

LIEUTENANT COLONEL V. A. ARMSTRONG, for the last four and one-half years connected with the Machine Tool Section of the Army and Navy Munitions Board, Washington, D. C., has recently returned to inactive duty and has joined the organization of the Cone Automatic Machine Co., Windsor, Vt.

Lieutenant Colonel V. A. Armstrong, Now Associated with the Cone Automatic Machine Co.

WINFRED L. FOSS has been appointed manager of the Boston district sales territory of American Machine and Metals, Inc., East Moline, Ill. He was previously regional sales manager of the Douglas T. Sterling Co. The Boston headquarters are located at 409 Park Square Bldg.

ARTHUR GORDON GREEN has been appointed sales manager of the Bay State Abrasive Products Co., Westboro, Mass. Mr. Green was formerly for twenty-eight years with the Norton Co., Worcester, Mass.

Arthur Gordon Green, New Sales Manager of Bay State Abrasive Products Co.

New Jersey

WALTER R. ELLIS, formerly chief sales engineer for the Logansport Machine Co., Inc., Logansport, Ind., has become associated with Compressed Air Products, Newark, N. J., sales representatives in the Newark territory for the Logansport company's products. Mr. Ellis has been associated with the Logansport Machine Co., for several years.

R. E. HENDERSON has been appointed eastern sales representative for the Wickman Corporation, Detroit, Mich. He assumes responsibility for sales and engineering service in the New York and New England territories of Wickman Swiss type high-precision automatics and precision profile grinders. His office is at 1060 Broad St., Newark 2, N. J.

JOHN S. BARNES CORPORATION, Rockford, Ill., announces that it has moved its eastern sales office from Room 1310, Fisk Bldg., 250 W. 57th St., New York City, to Room 660, Industrial Office Bldg., 1060 Broad St., Newark 2, N. J. E. C. HAWKINS will continue to be in charge of sales in the eastern territory.

New York

ELLIOTT HARRINGTON has been made manager of sales of the newly formed integral-horsepower alternating-current motor section of the General Electric Co., Schenectady, N. Y. J. T. FARRELL has been made manager of sales of the newly formed integral-horsepower direct-current motor section at Schenectady. D. A. YATES has been appointed assistant manager of sales of both sections, in charge of the Lynn motor sales group. He will be located at the Lynn, Mass., River Works.

WILLIAM J. PRIESTLEY has been elected president of the Electro Metallurgical Co.; the Electro Metallurgical Co. of Canada, Ltd.; the Michigan Northern Power Co.; and the Union Carbide Co. of Canada, Ltd., all Units of Union Carbide and Carbon Corporation. Mr. Priestley succeeds the late Francis P. Gormely. He is a graduate of Lehigh University, 1908, in metallurgical engineering, and became connected with the Electro Metallurgical Co. in 1923.

WILLIAM BAUSCH has been elected chairman of the board of the Bausch & Lomb Optical Co., Rochester, N. Y., succeeding his brother, Edward Bausch, who died recently. The new chairman has been with the Bausch & Lomb organization for over sixty years. He was instrumental in establishing the production of optical glass in this country prior to the first World War when European sources were shut off.

DR. WALTER M. MITCHELL, who has formerly held the position of metal-

lurgical engineer with the Carnegie-Illinois Steel Co. and other U. S. Steel subsidiaries, and who has more recently been chief metallurgist for the York Safe & Lock Co.'s special ordnance plant, has been appointed director of research for Mack Trucks, Inc., Long Island City, N. Y.

CARLTON S. PHILLIPS has been appointed New York manager of the L. S. Starrett Co., Athol, Mass. Mr. Phillips came with the Starrett organization in 1912 and has sold Starrett products for many years, especially in the New York and southern New England territories. The New York office is located at 53 Park Place.

K. R. VAN TASSEL has been named manager of the Industrial Control Division of the General Electric Co., Schenectady, N. Y. He succeeds GEORGE R. PROUT, who was recently appointed manager of the Air-Conditioning and Refrigeration Division of the Appliance and Merchandise Department.

Ohio

HAROLD P. DEVILBISS has been elected president and general manager of the DeVilbiss Co., Toledo, Ohio, manufacturer of spray painting equipment, air compressors, and other products. ALLEN D. GUTCHESS, formerly president, has been elected chairman of the board and active senior executive of the company. Mr. DeVilbiss was previously vice-president. FRANK A. BAILEY, who has been serving as vice-president and general manager, is retiring on account of poor health. DON J. PEEPS has been appointed acting chief engineer.

ROSCOE H. SMITH, who has been manager of Applied Engineering for the Reliance Electric & Engineering Co., Cleveland, Ohio, has been made head of a new sales promotion department to meet post-war requirements. He will be assisted by KENNETH F. ERTELL, who will be assistant advertising manager. RICHARD A. GEUDER, who has been manager of Metal Industry Applications, will assume Mr. Smith's former responsibilities as manager of Applied Engineering.

GEORGE N. FAIRCHILDS has been made manager of the Detroit branch of the Standard Tool Co., Cleveland, Ohio. Mr. Fairchilds, who was previously located in St. Louis, has been with the company for four years. FRANK B. ESTELL has joined the sales force of the company, covering the southwestern territory, with headquarters in St. Louis, Mo.

A. B. JOHNSON has been made plant manager of the Cleveland Pneumatic Tool Co., Cleveland, Ohio. He has been connected with the company for twenty-eight years, serving in many capacities.

CONRAD W. WALLIN has been appointed plant manager of Cleveland Pneumatic Aerol, Inc., a subsidiary of the Cleveland Pneumatic Tool Co.

D. K. SMITH has been appointed central district sales manager of the Steel and Tubes Division of the Republic Steel Corporation, Cleveland, Ohio, succeeding J. J. I. JAMIESON, who has been made manager of sales of the Mechanical Division. Mr. Smith has been with the organization since 1931.

J. A. IRELAND has been appointed general manager of sales of the Steel and Tubes Division of Republic Steel Corporation, Cleveland, Ohio. Mr. Ireland has been with the organization for more than twenty years.

ROBERT B. NUCKOLS, who has been with the Standard Tool Co., Cleveland, Ohio, since 1919, and who has been sales manager since April, 1943, has resigned from his position with the company.

Pennsylvania

JOSEPH S. BENNETT, recently manager of sales of the American Engineering Co., Philadelphia, Pa., has been elected vice-president of the company. Mr. Bennett has been connected with the

Joseph S. Bennett, Newly Elected Vice-president of American Engineering Co.

organization successively as draftsman, assistant construction engineer, assistant mechanical engineer, and manager of sales. He holds thirty-one United States patents.

ARTHUR M. MORGAN, vice-president in charge of sales of the Latrobe Electric Steel Co., Latrobe, Pa., has been elected a director of that company. Mr. Morgan has been associated with the Latrobe organization for the last fifteen years. In 1942 he was elected vice-president in charge of sales, with headquarters at the Pittsburgh, Pa., office.

Arthur M. Morgan, Recently Elected a Director of the Latrobe Electric Steel Co.

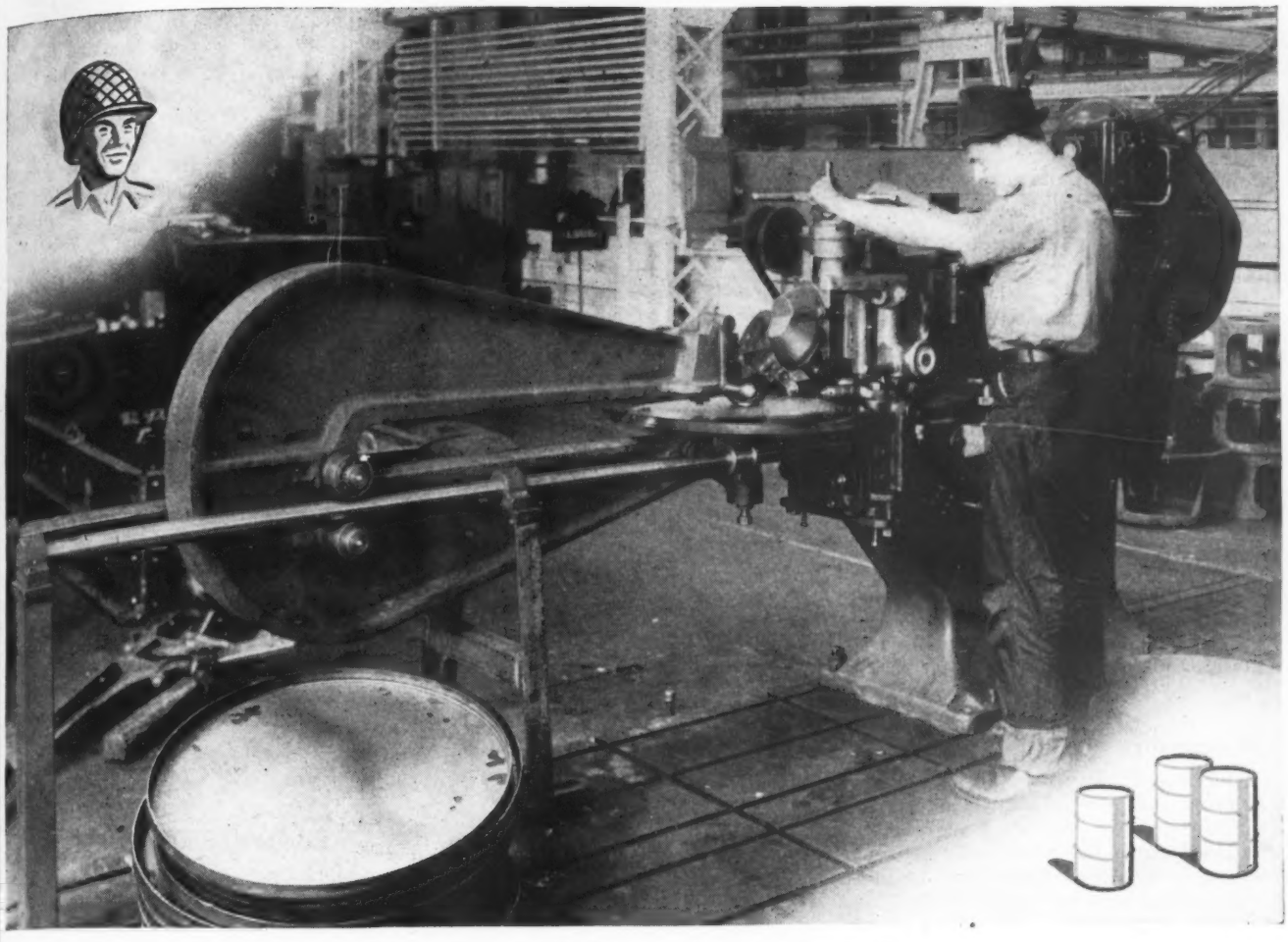
DONALD W. MCGILL has been made manager of the Machinery Electrification Section of the Industrial Department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. McGill came with the Westinghouse organization in 1933 as a member of the graduate training course. Recently he has handled contacts with the machine tool industry and for the last two years he has been the head of the annual Westinghouse Machine Tool Electrification Forum.

ROBERT A. CAMPBELL, sales manager of Talon, Inc., Steel Tube Division, Oil City, Pa., has recently been appointed general manager. He will continue to direct the sales activities, in addition to assuming his new duties. JOHN FARRIMOND has been made superintendent of finishing departments.

G. F. GOLBY has been appointed manager of the Toronto, Canada, branch office and warehouse of the Jessop Steel Co., Washington, Pa. Mr. Golby was with the Jessop organization from 1925 to 1929; since that time he was associated with the Crucible Steel Co. of America.

L. T. WILLISON has been made manager of cold finished sales of the Jones & Laughlin Steel Corporation, Pittsburgh, Pa. He will also continue as manager of ordnance sales. Mr. Willison has been with the Jones & Laughlin organization since 1927.

LLOYD W. HOPKINS has been appointed sales manager of the Reading Steel Casting Division of the American

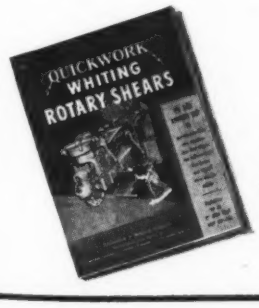


Cut out helmet blanks today— oil drum heads tomorrow

THERE'S NO RECONVERSION PROBLEM WITH THIS VERSATILE METALWORKING MACHINE

Your Quickwork shear will

- Cut straight lines
- Cut narrow strips
- Cut circles
- Cut beveled edges
- Cut irregular shapes
- Cut openings
- Joggle
- Make clean cuts without burrs at high speed —in a single pass



Write for bulletin.

Using Quickwork Rotary Shears for your war production *now* can save you time and money later when you reconvert to peacetime manufacturing. Quickwork shears that turn out helmet blanks today can cut oil drum heads or other civilian goods tomorrow—with no heavy reconversion expenses or period of enforced idleness involved.

With capacities that range from light gauge sheet to one-inch mild steel plate, Quickwork models to fit every requirement are available. Auxiliary attachments which enable you to use your shear for circle cutting, slitting and flattening, flanging, and joggling are also obtainable. Investigate the possibilities of Quickwork shears today—write for information.

QUICKWORK-WHITING DIVISION

WHITING CORPORATION

15673 LATHROP AVENUE, HARVEY, ILLINOIS

Chain & Cable Co., Inc. Mr. Hopkins, who will make his headquarters at Reading, Pa., has been with the organization for twenty-one years.

HAROLD L. WILSON, a member of the personnel staff of Lukens Steel Co., By-Products Steel Corporation, and Lukenweld, Inc., Coatesville, Pa., has been appointed assistant to the general superintendent in charge of personnel relations.

ALLOY RODS CO., York, Pa., manufacturer of stainless-steel electrodes, is erecting a two-story, all-brick plant approximately 270 feet long in West Manchester Township, Pa.

ADAM J. HAZLETT, general manager of sales of the Jones & Laughlin Steel Corporation, Pittsburgh, Pa., has been elected vice-president in charge of sales.

H. K. PORTER CO., INC., Pittsburgh, Pa., has purchased the Fort Pitt Steel Casting Co., McKeesport, Pa., manufacturer of high-test alloy-steel castings.

Wisconsin

DELTA MFG. CO., Milwaukee, Wis., announces that the company's advertising has been awarded first place among national magazine advertising in the annual competition sponsored by the National Advertising Agency Network. WALTER E. SCHUTZ is director of sales promotion of the company.

R. L. WILLIS has been appointed sales engineer of the Tocco Process Induction Heating Division of the Ohio Crankshaft Co., Cleveland 1, Ohio. Mr. Willis, though connected with the Chicago office of the company, will have headquarters in Milwaukee, Wis.

A. R. TOEPFER has joined the Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago 10, Ill., as district representative for the Wisconsin and Minnesota territory. He will make his headquarters in Milwaukee.

* * *

SAE National Tractor Meeting

A number of papers of interest to a much broader circle of engineers than those engaged in the tractor industry will be read at the National Tractor Meeting of the Society of Automotive Engineers in Milwaukee, September 13 and 14. One session will be devoted to gear teeth. A paper of especial interest to designers will be presented by Fred Bohle of the Illinois Tool Co., Chicago, Ill., entitled "The Design of Gear Teeth." A paper on steels will be read by H. B. Knowlton of the International Harvester Co., entitled "Steels from the Engineering Standpoint."

Obituaries

Amer-Photo

Frank Jerome Tone

Frank Jerome Tone, chairman of the board of The Carborundum Co., Niagara Falls, N. Y., died at his home in Niagara Falls, July 26, after a long illness. Dr. Tone was a pioneer in the fields of electrochemistry and electrometallurgy; to both of these fields of science he made many important contributions.

Dr. Tone was born in Bergen, N. Y., in 1868. He graduated from Cornell University in 1891 with a degree in mechanical engineering. He was then employed as an engineer by the Thomson-Houston Electric Co., Lynn, Mass., for two years and by the Pittsburgh Traction Co. for another two years. In 1895, he was engaged by the late Dr. E. G. Acheson, who four years previously had produced the first man-made abrasive known to industry, under the name of Carborundum. Taking advantage of the power developments at Niagara, Dr. Acheson decided to move his plant from Monongahela, Pa., to Niagara Falls and Dr. Tone was engaged as plant engineer.

Here his work in the abrasive field has been one of the outstanding factors in developing the abrasive industry. His achievements include an intensive study of the properties of abrasives, as well as of the processing and development of grinding wheels and other abrasive products. He was also responsible for many advancements and improvements in the production of coated abrasive products. He was granted over 150 patents pertaining to his inventions and discoveries.

In 1919, Dr. Tone was elected president of The Carborundum Co., and in 1942 he was made chairman of the board of directors. Many honors were conferred upon Dr. Tone at various periods of his career. In 1900 he was awarded the Paris Exposition Medal; in 1901, the Pan American Exposition Medal; and in 1904, the St. Louis Exposition Medal. He was president of the American Electrochemical Society in 1918-1919 and was the first man to receive the Schoelkopf Medal awarded by the Western New York Chapter of the American Chemical Society in 1931. The degree of Doctor of Science was conferred upon him by the University of Pittsburgh in 1935, and in the same year he was awarded the Edward Goodrich Acheson Medal by the Electrochemical Society. In 1938, the American Chemical Society awarded the Perkins Medal to him.

Dr. Tone was one of those men, rare in industry, who combine attributes of an outstanding scientist, inventor, and engineer with those of a keen business man and a farsighted executive. In addition, he was highly regarded as an authority on patents and patent law. With all this he combined such admirable and lovable traits of character that his genial personality was valued by all who knew him and who were associated with him.

Dr. Tone is survived by his widow, two sons, three grandsons, and a granddaughter.

Edward Bausch

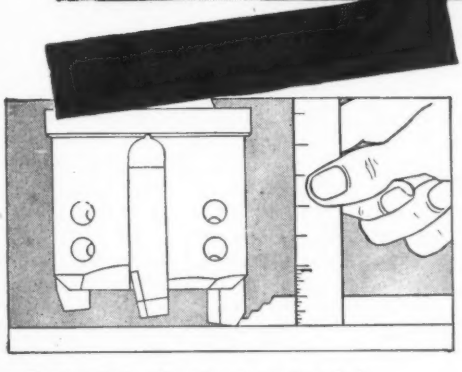
Edward Bausch, chairman of the board of the Bausch & Lomb Optical Co., Rochester, N. Y., died at his home in that city July 30 at the age of almost ninety years. Dr. Bausch was born September 26, 1854, within a stone's throw of the great plant on St. Paul Street in Rochester which he saw grow from a small spectacle shop to an industry of world renown. He was the son of John Jacob Bausch, one of the founders of the company with which he was identified during his en-

Edward Bausch

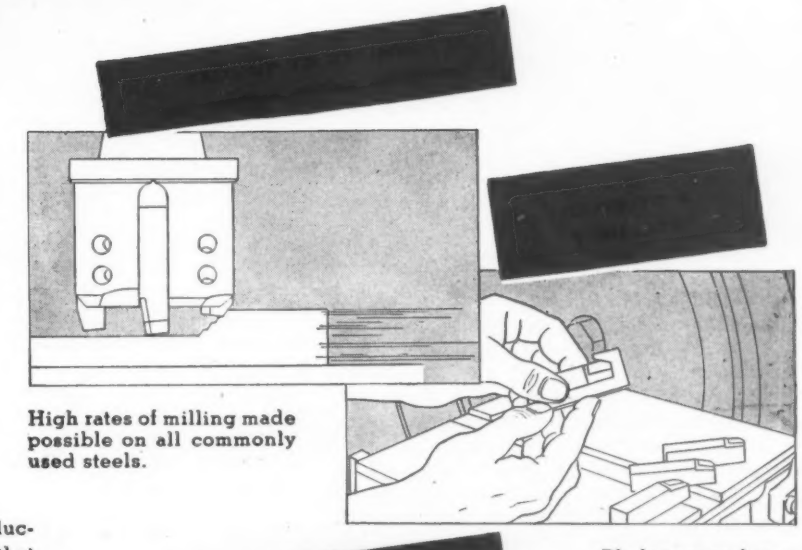
KENNAMILL STEP-CUTTERS

A Simplified Means To Multiply Milling Production with Available Equipment

Kennamills are inserted blade fly-cutters that, in most cases, enable available horsepower to be fully utilized in chip removal.

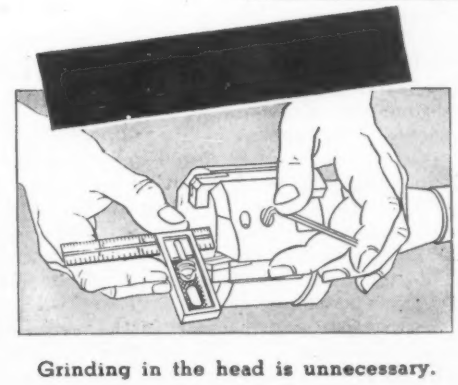


Desired depth of cut is divided into equal steps.



High rates of milling made possible on all commonly used steels.

Kennamills bring the advantages of high-production carbide milling of steel to every shop that has milling machines of reasonably recent manufacture. They are inexpensive, easy to set-up, and a cinch to maintain. Get in step with modern carbide milling by using this simplified method—write today for catalog information on Kennamills.



Blades are resharpened to template on ordinary carbide tool grinder.

Grinding in the head is unnecessary.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL Inc., LATROBE, PA.

tire life. He early showed great skill with tools and an aptitude for optical construction. He designed and built his first microscope at the age of eighteen.

A graduate of Cornell University, he entered his father's business in 1874, devoting himself especially to microscopes, for which he won an award at the Philadelphia Centennial Exposition in 1876. His activity in the development of microscopes and other laboratory instruments resulted in a succession of patents. The production and distribution of microscopes soon led to the development of many other optical products, such as projection apparatus and cameras,

Dr. Bausch and his associates also collaborated closely with the Armed Forces of the United States in the development of military instruments; and at the outbreak of World War I, they were successful in meeting one of the most critical emergencies facing the country at that time, the production of optical glass. Dr. Bausch was active in planning the expansion of the company's production facilities to meet the present war requirements until a year ago, when illness made his visits to the plant impossible. He still followed the progress of his company through the personal reports delivered to his home by company executives.

In 1908, the University of Rochester conferred upon Dr. Bausch the honorary degree of M.A., and in 1931, the LL.D. degree.

In addition to being chairman of the board of the Bausch & Lomb Optical Co., he was a member of the board of the Rochester Trust & Safe Deposit Co., the Lincoln Alliance Bank & Trust Co., and the Monroe County Savings Bank. He was also a director of the Taylor Instrument Company and of the Rochester & Genesee Valley Railroad.

Edgar Hiel Bristol

Edgar H. Bristol, president of the Foxboro Co., Foxboro, Mass., and one of its founders, died suddenly of a heart attack July 24 at his summer home at Falmouth Heights, Mass. Mr. Bristol was born in Naugatuck, Conn., in 1871. After completing his high school education, he worked as a machinist and toolmaker, and subsequently became production manager of the instrument company of which his father was president. With his brother, Bennet B. Bristol, he organized, in 1908, the Industrial Instrument Co., which, in 1914, became the Foxboro Co., of which he served as president until his death.

Mr. Bristol had an inventive mind and had obtained more than forty patents, some of them so basic in character as to establish new principles of instrument design and operation. He is survived by his widow, a son, Benjamin H. Bristol, four daughters, and sixteen grandchildren.

J. A. Schermerhorn

J. A. Schermerhorn, works manager fo the American Welding Co., Carbondale, Pa., a subsidiary of the American Car & Foundry Co., died suddenly on August 3 at his home, at the age of thirty-seven years. He was born in Carbondale and was a graduate in mechanical engineering of the Penn State College, class of 1928. During vacation periods, while at college, he worked in the plant of the American Welding Co., and upon leaving college entered the plant as a draftsman. Later he was employed as sales engineer, and in 1938 was appointed works manager. Mr. Schermerhorn is survived by his mother, his wife, and a daughter, and also by a brother serving overseas.

William B. Marvin

William B. Marvin, secretary of the Farrel-Birmingham Co., Inc., Ansonia, Conn., died on August 13 after a short illness, at the age of sixty-four years. He had been connected with the company for thirty-nine years, having entered the employ of the Birmingham Iron Foundry in 1905. Mr. Marvin was treasurer of the latter firm at the time of the amalgamation of the Farrel and Birmingham companies in 1927. He became assistant secretary and director of the new company, and in 1943 was elected secretary.

William R. Winter

William R. Winter, vice-president of the Potter & Johnston Machine Co., Pawtucket, R. I., died suddenly on August 10, in New York while on a business trip, at the age of sixty-eight. Mr. Winter had been associated continuously with the company since 1902, four years following its founding by James C. Potter and John Johnston in 1898. As director of foreign sales, he had resided abroad the greater part of thirty-five years—until 1937—when he returned to Pawtucket. From that time, to the day of his passing, Mr. Winter directed the foreign sales work from the home office of the company. He was usually a representative at the National Machine Tool Builders' Association conventions.

* * *

Contest on Home Work-Shop Lay-out

Awards totaling $2500 are being offered to contestants in a national competition sponsored by the Delta Mfg. Co. for efficient and practical post-war home work-shop lay-outs. The first prize in the contest, which closes October 31, will be $1000 worth of power tools. There will be 199 other prizes. For further information, address the Delta Mfg. Co., Milwaukee, Wis.

Coming Events

SEPTEMBER 10-13—Eastern Plant Management Conference of leading executives and foremen to be held at the Sagamore Hotel, Lake George, N. Y., under the auspices of the National Metal Trades Association, 122 S. Michigan Ave., Chicago, Ill.

SEPTEMBER 21-23—Annual meeting of the NATIONAL TOOL AND DIE MANUFACTURERS ASSOCIATION at the Hotel Statler, Buffalo, N. Y. M. W. Rowell, general manager. Southern Bldg., 15th and H Sts., Washington, D. C.

OCTOBER 2-5—Fall meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at the Netherland-Plaza Hotel, Cincinnati, Ohio. Clarence E. Davies, secretary, 29 W. 39th St., New York 18, N. Y.

OCTOBER 5-7 — Aircraft Engineering and Production Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Hotel Biltmore, Los Angeles, Calif. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

OCTOBER 12-14—Semi-annual meeting of the AMERICAN SOCIETY OF TOOL ENGINEERS at Syracuse, N. Y. Adrian L. Potter, executive secretary, 2567 W. Grand Blvd., Detroit 8, Mich.

OCTOBER 16-19 — Annual meeting of the AMERICAN WELDING SOCIETY in Cleveland, Ohio. Secretary, Miss M. M. Kelly, 33 W. 39th St., New York City.

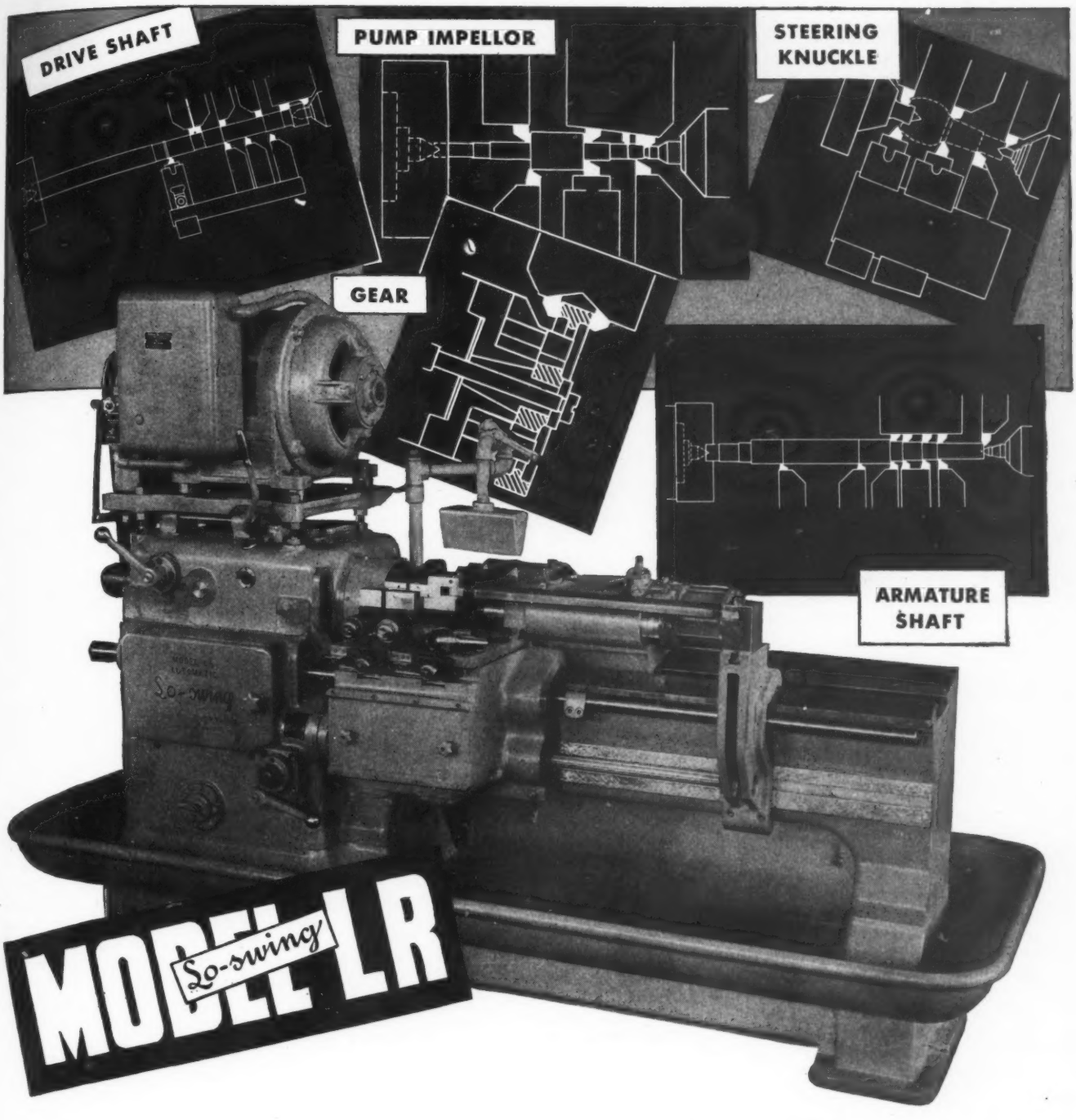
OCTOBER 16-20—Twenty-sixth annual meeting of the AMERICAN SOCIETY FOR METALS AND THE NATIONAL METAL CONGRESS, to be held at the Public Auditorium, Cleveland, Ohio. W. H. Eisenman, secretary, American Society for Metals, 7301 Euclid Ave., Cleveland.

OCTOBER 17-20 — Fall meeting of the Society for Experimental Stress Analysis at Carter Hotel, Cleveland, Ohio. W. M. Murray, president, P. O. Box 168, Cambridge 39, Mass.

OCTOBER 30 - NOVEMBER 1 — Twenty-seventh semi-annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at the Edgewater Beach Hotel, Chicago, Ill. Newbold C. Goin, executive secretary, Empire Bldg., Pittsburgh 22, Pa.

NOVEMBER 2-3 — Eighth annual NATIONAL TIME AND MOTION STUDY CLINIC at the Medinah Club, Chicago, Ill., under the auspices of the Industrial Management Society. Further information can be obtained from the vice-president of the Society, C. S. Becker, 205 W. Wacker Drive, Chicago 6, Ill.

NOVEMBER 15-19 — THIRD NATIONAL CHEMICAL EXPOSITION in the Chicago



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Coliseum, Chicago, Ill. M. H. Arveson, chairman Exposition Committee, American Chemical Society, 330 S. Wells St., Chicago 6, Ill.

NOVEMBER 27 - DECEMBER 1 — Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS at Hotel Pennsylvania, New York City. Clarence E. Davies, secretary, 29 W. 39th St., New York 18, N. Y.

NOVEMBER 27-DECEMBER 2—SIXTEENTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING in Madison Square Garden, New York City. For further information, apply to Charles F. Roth, president, International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

JANUARY 8-12, 1945—Annual meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Book-Cadillac Hotel, Detroit, Mich. Further information can be obtained from John A. C. Warner, secretary and general manager, 29 W. 39th St., New York City.

New Books and Publications

WAGE INCENTIVES. By J. K. Louden. 174 pages, 5 1/2 by 8 1/2 inches. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $2.50.

The author of this book, who is production manager of the Glass and Closure Division of the Armstrong Cork Co., has written it primarily from the management and labor point of view rather than from that of the engineer. He has endeavored to avoid excessive technical detail without sacrificing clearness and a comprehensive treatment. The contents of the book will be best understood from a review of the twelve chapter headings: A Brief History of Wage Incentives; Relationships of Wage Incentives to Other Phases and Functions of Management; Five Fundamental Types of Wage Incentive Plans; Eleven Basic Requirements of a Sound Incentive Plan; Comparison of Incentive Plans; Policies Governing Wage Incentive Payments to Insure Their Fair and Equitable Administration; Wage Administration; Cost Control Reports; Supervisory or Key Man Incentives; The Control of Quality in Incentive Installations; Typical Incentive Installations; and Union Participation.

THE OXY-ACETYLENE HANDBOOK. 587 pages, 6 by 9 inches, 405 illustrations. Published by The Linde Air Products Company, 30 E. 42nd St., New York 17, N. Y. Price, $1.50.

This manual on oxy-acetylene welding and cutting procedures has been planned as a basic handbook, specifically for use in colleges and vocational schools and in other teaching institutions having courses in welding and construction methods. The book will also prove useful in industrial plants that train welding and cutting operators. Plant managers, engineers, designers, superintendents, foremen, and operators in shops where oxy-acetylene processes are used will also find this book of assistance. Every effort has been made in the preparation of this book to make it a text-book on the manual application of the oxy-acetylene processes that will be of the greatest aid either in self-instruction or in classroom work. The subject matter has been limited to those manual operations and principles with which the experienced operator and student are concerned, but generally applicable mechanized processes have also been briefly described.

S A E HANDBOOK — 1944 EDITION. 804 pages, 5 1/2 by 8 1/2 inches. Published by the Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. Price, $5.

The new edition of the Handbook of the Society of Automotive Engineers reflects the rapid changes that are being made in the industrial and technical fields during the war years. Not less than 630 text pages contain new and revised data. The new features include specifications for medium- and heavy-duty coolant hoses; detailed standards for straight and taper pipe threads; standards for tractor power take-off and draw-bar hitches; standards for spring lock-washers; and nomenclature for pistons and piston-rings. The revised data include classification of natural and synthetic rubber compounds; tables of steel hardness conversion numbers; standards for tube fittings on fuel and oil lines; and specifications for non-ferrous metals, including solders, aluminum, magnesium, bronzes, and bearing and bushing alloys.

LAYING OUT FOR BOILER MAKERS AND PLATE FABRICATORS. By George M. Davies, 522 pages, 8 1/2 by 11 inches, 762 illustrations. Published by Simmons-Boardman Publishing Corporation, New York 7, N. Y. Price, $7.

This is the fifth edition of a comprehensive work that was first published in 1907. It was then designed as a guide on the lay-out of boilers, tanks, pipes, stacks, elbows, and various other types of sheet-metal work. The new edition has been revised by a boiler designer who specializes on locomotive boilers. The chapters on the locomotive boiler have been expanded, while the chapter on the now largely obsolete Scotch boiler has been left out. Two new chapters on locomotive boiler construction, one on laying out and computing boiler patches, and another on laying out for welded construction —a subject of particular importance to repair-shop men—have been added.

PLASTIC MOLDS. By Gordon B. Thayer. 136 pages, 6 by 9 inches, 81 illustrations. Published by American Industrial Publishers, Fairmount-Cedar Bldg., Cleveland 6, Ohio. Price, $3.50.

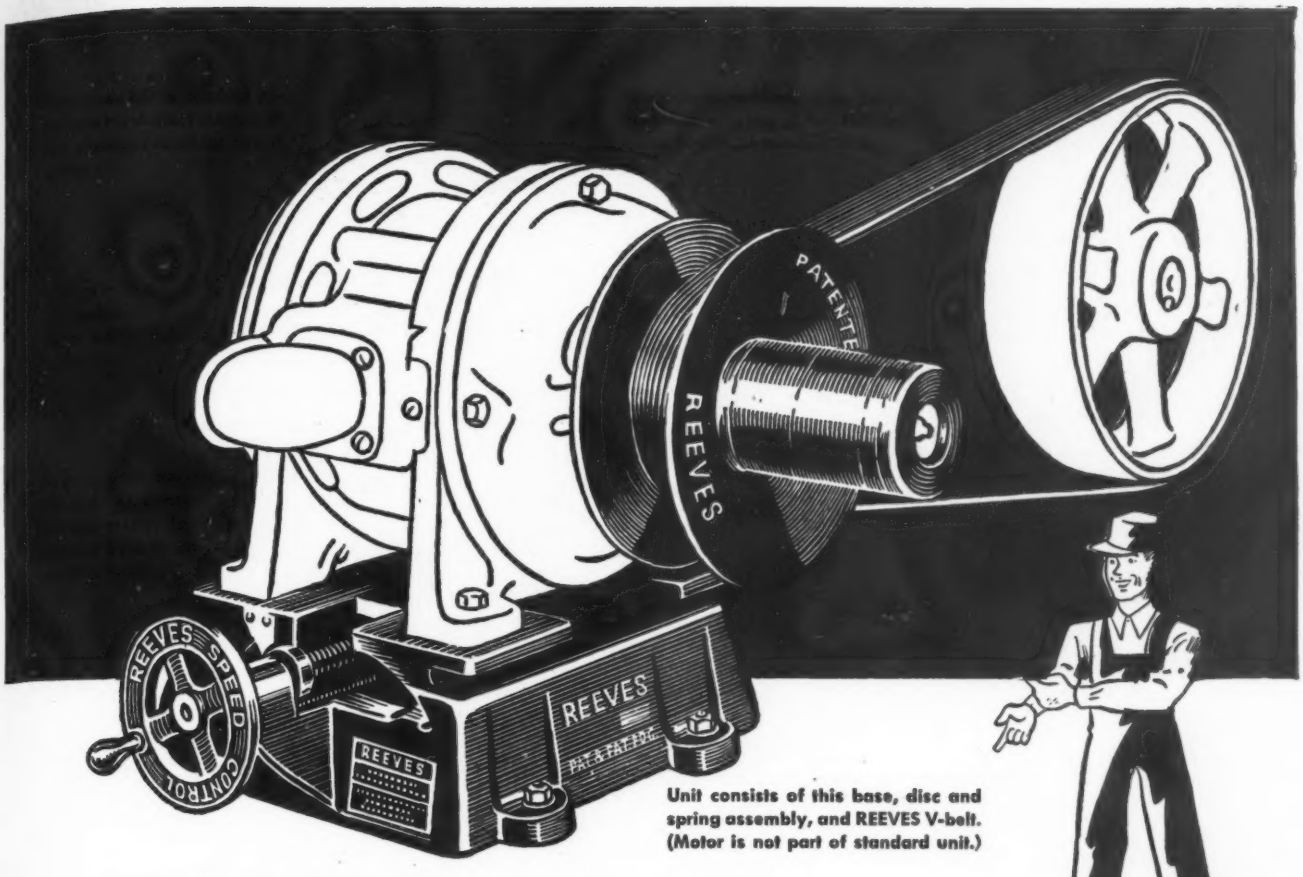
This is the second edition of a book originally published three years ago. The great impetus given to the plastics industry by the demands of war production has hastened many technical developments. Some of these might, under ordinary conditions, have taken years to pass through the initial stages, whereas now this has been achieved in months, if not in weeks. The new edition of this book, which deals with the design, construction, and use of plastic molds, will, therefore, prove of value to all who are engaged in work involving their application.

BOLTS, NUTS, AND SCREWS. Compiled by A. E. R. Peterka. 180 pages, 9 by 12 inches. Published by the Lamson & Sessions Co., Cleveland, Ohio. Price, $1.

This book contains a collection of practical discussions on engineering, design, and production of headed and threaded products. It is made up of a large number of articles selected from the technical press, describing various methods and processes employed in the bolt, nut, and screw industry, and deals with the proper procedure in making the important machine parts used as fastenings in machine construction. Anyone concerned with bolts, nuts, and screws from an engineering point of view will find much of value in this volume.

AUTOMATIC CONTROL ENGINEERING. By Ed Sinclair Smith. 367 pages, 5 1/2 by 8 1/2 inches. Published by the McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Price, $4.

More than twenty years' experience in the development of metering and automatic control mechanisms has been concentrated in this book. The author has aimed at providing the reader with an aid in solving problems in automatic regulation. The book deals with fundamental principles, rather than with specific applications. The treatment is scientific and highly mathematical. It should prove especially useful to those who are engaged in this work, since it is the first book on control engineering proper to appear in the English language.



Unit consists of this base, disc and spring assembly, and REEVES V-belt. (Motor is not part of standard unit.)

REEVES VARI-SPEED MOTOR PULLEY

Two cone-faced discs are mounted on the standard motor shaft extension. Motor is mounted on adjustable base. Through handwheel control, motor is moved forward or back, varying depth of throat between discs. A REEVES V-belt, running between discs and connected to driven machinery, is kept under constant tension by a compression spring. As depth of throat is varied, V-belt assumes different diameters of contact against discs. Speed adjustments are infinite between the limits, and are made while equipment is running. Constant torque; variable horsepower.

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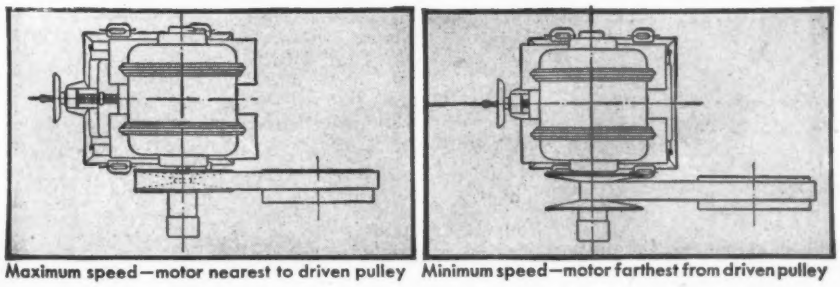

Maximum speed—motor nearest to driven pulley

Minimum speed—motor farthest from driven pulley

THESE VITAL ADVANTAGES for War Production

FULL-RANGE SPEED ADJUSTABILITY: Not just steps in speed, but any speed—to meet changes in size, shape, periphery or type of work.

NO WASTE IN TIME OR MATERIALS: Speed can be adjusted to skill of workers, to prevent waste and spoilage. Speed changes made without stopping driven machine. Valuable aid to new workers.

OPERATING PRINCIPLE PROVED in 260,000 installations, including use as standard equipment on 1,885 different makes of machines.

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